THE EFFECTS OF A TIER 3 PRE-KINDERGARTEN LANGUAGE INTERVENTION ON CHILDREN WITH HEARING LOSS WHO COMMUNICATE ORALLY

BY

Joo Young Hong

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Ann P. Turnbull, Ed.D., Chairperson

H. Rutherford Turnbull, III, LL.M. /J.D., Co-chair

Jane Atwater, Ph.D.

Judith J. Carta, Ph.D.

Charles R. Greenwood, Ph.D.

Sally L. Roberts, Ph.D.

Date defended: 22 May, 2013

This Dissertation Committee for Joo Young Hong certifies
that this is the approved version of the following dissertation:

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Ann P. Turnbull, Ed.D., Chairperson

H. Rutherford Turnbull, III, LL.M. /J.D., Co-chair

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ABSTRACT

This dissertation includes four independent but related chapters. The first chapter provides an overview regarding the whole dissertation document. Chapter 2 reports the procedures and results of a research synthesis focusing on vocabulary, oral language, and/or storybook reading instruction for children with hearing loss who communicate orally. The third chapter is a research study which used a single-subject design in order to assess the effectiveness of a tier-3 level of language intervention for children with hearing loss within a response to intervention (RTI) model. This research study also reports the relationship between children's hearing characteristics and their language performance. Although this research study focuses on children with hearing loss, the results can also be considered in light of children with weak language skills due to factors other than hearing loss. The final chapter presents specific strategies for teachers and parents regarding how early childhood teachers and parents of young children with hearing loss can assist their children's vocabulary and oral language development through storybook reading instruction, and ultimately support these children to become better readers.

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CHAPTER 1

Overview: Investigation, Purpose, and Scope of Dissertation Research

Being able to read is one of the most desired educational outcomes in contemporary society. The No Child Left Behind Act of 2001 (No Child Left Behind [NCLB], 2002), required that schools ensure that all students be able to read at or above grade level by the end of the third grade and demonstrate adequate student yearly progress. However, children with hearing loss are still one of the most vulnerable populations in developing adequate reading skills due to their restrictions in auditory communication and the perceptual limitations of lipreading as a receptive communication mode for English acquisition, either alone or in combination with listening (Howell & Luckner, 2010). In addition, Wilson and Hyde (1997) reported that a combination of communication, instructional, linguistic, and experiential deficits results in relatively few deaf students being able to derive sufficient meaning from text beyond the word level or to comprehend complex text (Wilson & Hyde, 1997). On average, high school graduate students with hearing loss read at the levels of fourth and fifth graders without hearing loss (Traxler, 2000). Consequently, students with hearing loss complete their education without being able to read well (Luckner & Handley, 2008).

Thanks to the universal newborn screening and technology development (i.e., cochlear implant or hearing aids), more recent generation of children with hearing loss are likely to have a better long-term results regarding language and literacy development which are critically related to reading success (Spencer & Oleson, 2008). According to Dickinson and colleagues (2003), children's early development of oral language and vocabulary influence their reading skills at the early stage of learning to read. Several researchers have also reported that this pattern was also apparent in children's later elementary years when vocabulary and oral narrative skills aid in

fluent reading for understanding (Dickinson & Tabors, 2001, Griffin, Hemphill, Camp, & Wolf, 2004; Scarborough, 2001; Senechal & LeFerve, 2002; Storch & Whitehurst, 2002). Similarly, several research studies have reported the positive relationship between vocabulary/language skills and reading achievement for children with hearing loss (Connor & Zwonlan, 2004; Kyle & Harris, 2006; Paul, 1996). Given the recently increasing number of children with hearing loss who use oral communication, it is highly important to provide these children with effective vocabulary, oral language, and storybook reading instruction in order for them to become better readers.

The purpose of this dissertation is to investigate the effectiveness of vocabulary, oral language, and storybook reading instruction to assist children with hearing loss who communicate orally to become better readers. Specifically, this dissertation addresses each of the three purposes in the following three sections. First, a research synthesis focuses on vocabulary, oral language, and/or storybook reading instruction for orally communicable children with hearing loss in order to understand the critical components of effective vocabulary, oral language and/or storybook reading instruction for these children. Second, a single-subject design study was conducted and outcomes are reported in order to assess the effectiveness of a tier 3 level of language intervention not necessarily for children with hearing loss, but for children with weak language skills within a response to intervention (RTI) model. The final section addresses implications for teachers as well as parents regarding how early childhood teachers and parents of young children with hearing loss can assist their children's vocabulary and oral language development through storybook reading instruction, and ultimately support these children to read better.

Research Synthesis

In chapter 2, the research synthesis provides an overview of the research on vocabulary, oral language, and/or storybook reading instruction for children with hearing loss who are capable to communicate orally. At the beginning, I review the positive relationship between vocabulary, oral language, and storybook reading instruction and reading ability. Based on the relationship, I describe the importance of vocabulary, oral language, and storybook reading instruction in order for orally communicable children with hearing loss to become better readers. Next, I describe the process I followed and outcomes of searching for appropriate research studies from 1990 to 2013. Based on this literature, I document the critical elements of vocabulary, oral language and/or storybook reading instruction and its outcomes according to the following themes: (a) study design and sample size; (b) characteristics of participants; (c) intervention features; and (d) measurement outcomes. Finally, I propose implications for teachers and parents of children with hearing loss focusing on effective and feasible vocabulary, oral language, and/or storybook reading instruction for children with hearing loss who use oral communication. In addition, I identify the needs of future research in conducting efficacy research on the topic of vocabulary, oral language, and/or storybook reading instruction for children with hearing loss.

Research Study

I conducted a repeated acquisition single-subject design (Kennedy, 2005) to test the efficacy of a vocabulary and oral language intervention which was developed by a four-site research consortium, using storybook materials and procedures designed to promote language skills for children identified as needing tier 3 support in RTI models. That is, this particular intervention was not developed specifically for children with hearing loss, but for children with

weak language skills in general. For the past three years, this intervention resulted in benefits for English language learning (ELL) children and children with speech delays. This research study is the first efficacy study of the intervention for children with hearing loss who can communicate orally. For the intervention, I used that same intervention after being trained by the original developer of the intervention in order to assist preschool children with hearing loss to learn vocabulary and increase oral language skills through storybook reading and related activities. I measured children's vocabulary and language development across the intervention phases to determine whether the intervention was effective to assist children with hearing loss who communicate orally to develop vocabulary and oral language skills. Findings indicate that children improved their vocabulary and oral language skills through the storybook reading and related activities. Chapter 3 includes a full research study description comprised of significance, methods, results and discussion.

Research to Practice

The purpose of chapter 4 is to translate the research intervention into practices that are usable for teachers as well as parents of children with hearing loss in order for them to help their children develop vocabulary and oral language through storybook reading instruction. I merged findings from the research study and information from the research synthesis to identify these practical strategies for teachers as well as parents of children with hearing loss. My intended outcome for teachers and parents of children with hearing loss after reading this chapter is to easily use critical instructional strategies to increase their children's vocabulary and oral language through storybook reading.

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CHAPTER 2

Vocabulary, Oral Language, and Storybook Reading Intervention for Young Children with Hearing Loss Who Use Oral Language: A Research Synthesis

Abstract

Developing earlier reading capability is critical given the fact that children experience extreme difficulties in reading and other academic areas later school years unless they learn how to read in earlier grades. Although the universal newborn screening and development of cochlear implant and hearing aid technology have enabled more recent generation children with hearing loss to effectively use oral communication skills, these children still have difficulty in developing adequate reading skills. As a way of enhancing children's reading skills, this study aims to identify effective vocabulary, oral language, and storybook reading interventions for children with hearing loss who communicate orally. A total of nine studies met the inclusion criteria through the search for appropriate research studies from 1990 to 2013. Each study was analyzed to identify: (a) study design and sample size; (b) characteristics of participants; (c) intervention features; and (d) measurement outcomes. This research synthesis presents the effectiveness of the interventions for orally communicable children with hearing loss. Implications for present practices as well as future research studies are discussed.

Keywords: vocabulary, oral (spoken) language, storybook reading, children with hearing loss, deaf and hard-of-hearing, hearing impairment, cochlear implant, hearing aid, research synthesis

Chapter 2

Vocabulary, Oral Language, and Storybook Reading Intervention for Young Children with Hearing Loss Who Use Oral Language: Research Synthesis: A Research Synthesis

Introduction

The purpose of this research synthesis is to identify effective vocabulary, oral language and/or storybook reading interventions for young children with hearing loss who communicate orally, where "effective" is measured by the children's improvement in vocabulary, oral language, and/or reading comprehension skills. Initially, I will describe why reading is important for children in general, and the rationale for reading being a challenge, particularly for children with hearing loss (i.e., the inability to detect sounds either partially or fully). Second, I will introduce the relationship between vocabulary/language and reading skills of children with and without hearing loss. Third, I will explain the relationship between storybook reading and reading skills of children with and without hearing loss. Fourth, I will emphasize the importance of vocabulary, language, and/or storybook reading interventions as interrelated factors for the reading success of children with hearing loss. Finally, I will provide the procedures and results of a research synthesis of these factors. It is hoped that teachers and parents can learn implications from this research synthesis.

Importance of Reading and Rationale for Reading Being a Challenge

In contemporary society, the development of their students' reading skills is one of educators' most fundamental responsibilities. According to the No Child Left Behind Act of 2001(No Child Left Behind [NCLB], 2002), children should be able to read at or above grade level by the end of third grade. In addition, they should demonstrate adequate progress anually. However, reading, which is "the active process of construction meaning from text" (Vaughn &

Linan-Thompson, 2004, p.98), is a complex procedure that involves the use of cognitive and metacognitive skills, including great attention, prior knowledge and experience, clear vocabulary concepts, inferential strategies, and the capacity to connect main ideas (Brown & Brewer, 1996; Vaughn & Linan-Thompson, 2004). Likewise, Perfetti (1992) stated that effective word identification and decoding skills are critical for reading and comprehension.

Reading success enables children to perform better on complex verbal and higher order cognitive tasks than those children who experience reading failure (Cunningham & Stanovich, 1998). Chard and Kameenui (2000) noted that about 90% of children with poor reading skills in first grade are likely to continue to have poor reading skills throughout their schooling. Later, these students with reading failure are likely to become eligible to receive special education services, which are more costly and less effective than if interventions were started earlier. As a result, prevention of reading failure for young children is critical.

Difficulty of Reading among Children with Hearing Loss

Sensory losses seriously impact communication competence and language skills (Paul, 2001). Therefore, regardless of the degree of hearing loss, children with hearing loss lack sufficient language skills to become good readers (Davis, Elfenbein, Schum, & Bentier, 1986; Mayne, 1999). In fact, research indicates that reading is the most challenging academic skills for the majority of individuals with hearing loss, (Howell & Luckner, 2010). According to Howell and Luckner (2010), children with hearing loss have difficulty developing appropriate reading skills because of their limitation of hearing. Specifically, many children with hearing loss are unable to use adequate auditory and/or lipreading skills to communicate. In addition, Wilson and Hyde (1997) reported that fewer students with hearing loss are able to understand complex text

or the text beyond word level due to the combination of communication, instructional, linguistic, and experiential deficits (Wilson & Hyde, 1997).

In particular, children with prelingual hearing loss experience even more delays in language development because their hearing loss occurred prior to speech and language acquisition (Dimling, 2010). According to Blair and colleagues' (Blair, Peterson, & Viehweg, 1986) study, about1st through 4th grade reading comprehension, children with hearing loss gained less reading skills compared to their hearing peers and these gaps increased across the grades. On average, high school graduates with hearing loss read at about fourth grade level (Paul & Quigley, 1994; Traxler, 2000). Consequently, most students with hearing loss complete their education without being able to read well (Luckner & Handley, 2008).

Relationship between Vocabulary/Language and Reading Skills

Research has demonstrated that children's vocabulary/language development is associated with their storybook reading skills (Crain-Thoreson & Dale, 1999; Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Scarborough & Dobrich, 1994). For example, Dickinson et al. (2003) found that the early development of vocabulary/language of children impacts their reading skills at the early stage of learning to read. This pattern was also apparent in children's later elementary school years when fluent reading for understanding is promoted by vocabulary and oral narrative skills (Dickinson & Tabors, 2001, Griffin, Hemphill, Camp, & Wolf, 2004; Scarborough, 2001; Senechal & LeFerve, 2002; Storch & Whitehurst, 2002). Similarly, a number of studies reported that language development at an early age is recognized as important because it relates positively to later reading success (Scarborough, 2001; Snow, Burns, & Griffin, 1998; Whitehurst & Lonigan, 1988).

Several research studies have demonstrated the positive relationship between vocabulary/language and reading achievement among children with hearing loss (Aram, Most, & Mayafit, 2006; Connor & Zwolan, 2004; Fung, Chow, & McBride-Chang, 2005; Kyle & Harris, 2010; Paul, 1998). For example, in a 3-year longitudinal study, Kyle and Harris (2010) found that vocabulary and speechreading skills were predictors of later reading achievement for 29 children with hearing loss. Similarly, Connor and Zwolan's (2004) study reported that the stronger language skills of children with cochlear implants contributed to their reading achievement.

Relationship between Storybook Reading and Reading Skills

Research indicates that exposure to frequent storybook reading increases a child's reading achievement. For instance, Wells (1985) found that children aged from 15 months to 14 years old became better readers when they were exposed to more frequent shared reading experiences. Similarly, Zevenbergen and Whitehurst's (2003) dialogic reading intervention enabled preschool children to increase later reading comprehension skills. Furthermore, the positive effects lasted into their elementary school years.

There is a paucity of research on the relationship between storybook reading and reading comprehension skills of children with hearing loss. However, research indicates that reading intervention could improve reading comprehension skills of children with hearing loss (Johnson & Roberson, 1988; Pakulski & Kaderavek, 2012). Johnson and Roberson (1998), for example, found that a three-month experiential storybook reading intervention positively impacted the reading comprehension skills of children with hearing loss. One of the research studies included in this research synthesis (i.e., Pakulski & Kaderavek, 2012) reported that reading intervention using manipulative features in a dyadic reading setting improved narrative reading

comprehension of children with hearing loss. More detailed information about this study will be provided in the "synthesis results" section.

Relationship between Storybook Reading and Vocabulary/Language Skills

The exposure to frequent storybook reading also increased children's vocabulary/language development (Crain-Thoreson & Dale, 1999; Scarborough & Dobrich, 1994). Research studies have demonstrated that children improve their acquisition of language skills through increased story reading at home and/or school (Chow & McBride-Chang, 2003; Lim & Cole, 2002; Vivas, 1996; Whitehurst & Lonigan, 1988; Zevenbergen & Whitehurst, 2003). For example, Lim and Cole (2002) found that dialogic storybook reading instruction increased young Korean children's receptive and expressive language skills in the Korean language. Similarly, kindergarteners in Hong Kong enhanced their language and literacy skills by receiving dialogic storybook reading instruction (Chow & McBride-Chang, 2003). Storybook reading was effective even for hearing preschool children with communication problems in improving their receptive and expressive vocabulary (Ezell, Justice, & Parsons, 2000).

Similarly, frequent storybook reading positively impacted vocabulary/language development of children with hearing loss. According to Aram and colleagues (2006), storybook reading was the predictor of vocabulary and other linguistic skills (i.e., phonological awareness and general knowledge) for children with hearing loss. Fung and colleagues (2005) implemented a dialogic storybook reading intervention for Hong Kong children with hearing loss, and the participating children improved their vocabulary skills as the result of the intervention.

As stated above, vocabulary, language, and reading are interrelated. Recently, the National Early Literacy Panel (NELP) supported this relationship documenting that both storybook reading and vocabulary/language development are predictors of later reading skills

(Shanahan & Lonigan, 2010). Given the important relationship among vocabulary, language, and reading, allowing children with hearing loss to read and providing effective vocabulary/language instruction are critical for the children's reading success.

Numerous efforts have been made in the field of deaf education to assist children with hearing loss to acquire adequate literacy and language skills (Delk & Weidekamp, 2001; Schimmel, Edward, & Prickett, 1999; Fung et al., 2005; Gillespie & Twardosz, 1997; Howell& Luckner, 2010; Kelly, Albertini, & Shannon, 2001; Luetke-Stahlman, Griffiths, & Mongomery, 1998; Mueller & Hurtig, 2010; Moeller, 2000; Ertmer, Leonard, & Pachuilo, 2002; Wilson & Hyde, 1997). For example, Gallaudet University professors designed the Shared Reading Project to increase deaf and hard-of-hearing children's exposure to shared storybook reading, ultimately to enhance the children's literacy and language skills (Delk & Weidekamp, 2001). In this project, parents learned techniques to read to their children with hearing loss by observing deaf adults' signing a story in a live situation. This project resulted in enhanced children's literacy skills, parent's increased interaction with their children with hearing loss, enhanced children's attention, improved parents' sign language skills, and more frequent storybook reading.

Later, the Iowa Signing E-Book successfully embedded technology and thus reduced the cost of having deaf adults provide the signed reading (Mueller & Hurtig, 2010). Wilson and Hyde (1997) conducted an experimental study with 16 children aged 8 to 13 in order to examine deaf children's reading comprehension through the use of signed English pictures in conjunction with printed text compared to using only printed text. In the study, the children performed better with the Signed English text. A comprehensive early intervention program, including weekly home visits and sign language class for parents, resulted in vocabulary improvement of deaf and hard-of-hearing children who used total communication (Moeller, 2000). The majority of studies,

however, focused on interventions using sign language and total communication rather than the oral language method.

Approximately 92% of children with hearing loss have hearing parents (Mitchell & Karchmer, 2004). Therefore, parents typically desire to use oral communication with their children if possible. Fortunately, the universal newborn screening and technology development (i.e., cochlear implant or hearing aids) have recently enabled more children with hearing loss to use oral communication. Unlike hearing children who interact with the environment and thus naturally acquire language and speech, children with hearing loss need specific interventions to increase their language and speech (Moeller, 2000). In fact, recent studies indicate that children with hearing loss demonstrate similar language skills as their hearing peers as long as appropriate and comprehensive intervention programs are provided as early as possible (Moeller, 2000; Yoshinaga-Itano, 2003) Accordingly, it is important to provide vocabulary, oral language, and storybook reading interventions to children with hearing loss who communicate orally to help them increase their language skills and, ultimately improve their reading abilities.

As stated at the beginning of this chapter, the purpose of this study was to identify effective vocabulary, oral language, and storybook reading interventions for young children with hearing loss who communicate orally. Based on the findings of the research synthesis, this study will also provide implications for research and practice.

Method

Search Procedures

To identify published research studies on vocabulary, oral language, and storybook reading interventions for children with hearing loss who use oral language, I used both computer searches and hand searches. Computer searches between the years 1990 and 2013 included the

electronic bibliographic databases of Psychological Abstracts (PsychINFO), Linguistics and Language Behavior Abstracts (LLBA), Academic Search Complete, Wilson OmniFile Full Text Select, and ProQuest research library. In addition to these electronic bibliographic databases, I included the search of e-journals databases for the major journals on this topic including American Annals of the Deaf; Journal of Deaf Studies and Deaf Education; Journal of Speech, Language, and Hearing Research; Communication Disorders Quarterly; The Volta Review; Ear and Hearing; Deafness and Education International; and Child Language Teaching and Therapy.

The topical keywords included: (a) vocabulary, (b) oral language, (c) spoken language, and (d) storybook reading. To include orally communicating children with hearing loss, these topical key terms were individually cross-referenced with each of the following terms: (a) hearing impair*, (b) hearing loss, (c) hard of hearing, (d) cochlear implant*, and (e) hearing aid*. In addition, I reviewed reference lists of every identified study to retrieve and find any studies on vocabulary, language, and storybook reading. I included only peer-reviewed journal articles excluding other types of literature (i.e., dissertation/ thesis studies, book chapters, conference presentations or unpublished articles).

Inclusive Criteria

A study had to meet the following criteria to be included:

(a) the study conducted a vocabulary, oral language or storybook reading intervention for children with hearing loss and who use spoken language as their primary method of communication; interventions conducted only by skilled professionals were excluded because of feasibility of the interventions (i.e., auditory-verbal therapy requires that an individual be certified to conduct the intervention);

(b) the study employed a quantitative design including pre-experimental (i.e., post-test, pre- & post-test, or pre-, post- & re-test), quasi-experimental, true-experimental or single-subject study design;

(c) the study measured the child's vocabulary, oral language, and/or reading comprehension skills; and

(d) the child was between 2 and 14 years old at the beginning of the study.

Synthesis Results

I identified a total of nine studies as the result of the search procedure. Table 1 summarizes the characteristics of research designs and participants of the reviewed studies.

Study Design and Sample Size

Four of the reviewed studies (44%) employed either a true- or quasi-experimental design. Another four studies (44%) used a pre-experimental design (i.e., pre-, post- & re-test; pre- & post-test; or post-test) which does not include any comparison groups. One study (Massaro & Light, 2004) used a multiple baseline single-subject design within each participant. The sample size was relatively small in each reviewed study ranging from one to 34 participants. This small sample size is understandable because hearing loss is a low incidence disability; and further, children with hearing loss who communicate orally are even more rare. As a result, a total of 146 children participated in the reviewed studies.

Characteristics of Participants

Among the 146 children, aged from 4 to 14 years old, about 43% of them were male (i.e., 63 children). The way hearing degree was reported varied across studies. A total of 47 children were reported as having profound hearing loss and eight children as having severe to profound hearing loss. Twelve children had severe hearing loss, and 14 children had moderately severe

Table 1

Characteristics of Research Designs and Participants

Study	Research Design	Age	Sample Size	Male	Hearing Degree	Technology	Residence
Barker (2003)	Pre-experimental (Pre-, post-, & re-test)	8-14 (M=11.1)	19	9	Profound (16) Hearing (3)	Cochlear implants Hearing aids Cochlear implant & hearing aid	U.S.A.
Fung et al., (2005)	True-experimental	5:2-9:1	28	17	Moderate to severe (28)	Not Reported	Hong Kong
Ingber & Eden (2011)	Pre-Experimental (Pre- & post-test)	4-7 (M=5.3)	34	14	Moderate (15) Severe (6) Profound (13)	Cochlear implants (6) Hearing aids (23) Cochlear implant & hearing aid (5)	Israel
Massaro & Light (2004)	Single-subject design	6:11-11	8	2	Profound (1) Severe (3) Moderate (2) Mild (1) Unknown (1)	Cochlear implants (1) Hearing aids (6) One hearing aid (1)	U.S.A.
Mollink, Hermans, & Knoors (2008)	Pre-Experimental (Pre-, post-, & re-test)	4:4-8:3 (M=5:11)	14	4	Moderate-to-severe (14)	Not Reported	Netherlands
Paatsch et al., (2006)	Quasi-experimental	5:9-12:2	21	9	Profound (16) Severe (3) Moderate (1) Mild (1)	Cochlear implants (15) Hearing aids (5) Cochlear implant & hearing aid (1)	Australia
Pakulski & Kaderavek (2012)	Quasi-experimental	9:4-11:1	7	2	Mild-to-moderate (1) Moderate-to-severe (2) Severe-to-profound (4)	Cochlear implants (2) Hearing aids (5)	U.S.A.
Pakulski & Kaderavek (2001)	Quasi-experimental	7-14	14	6	Mild (2) Moderately-severe to worse (12)	Cochlear implants (4) Hearing aids (10)	U.S.A.
Wills & Edwards (1996)	Pre-Experimental (Post-test)	4.3	1	0	Profound (1)	Cochlear implant	United Kingdom

hearing loss. A relatively large number of children (n=44) had moderate to severe hearing loss, and 16 children had moderate hearing loss. Five children had mild to moderate or mild hearing loss, and there was no hearing degree reported for one child in the Massaro and Light (2004) study. The remaining three participants were hearing children who provided comparative information in Barker's (2003) study. In summary, slightly more female children from diverse age groups and degree of hearing loss participated in the reviewed studies although the total number of participants is small.

In the six studies (67%) reporting the number of children who used technology, 27 children had cochlear implants, while 49 children used hearing aids exclusively. Seven children had a cochlear implant in one ear and hearing aid in the other. Therefore, the majority participants in the reviewed studies used hearing aids.

Interestingly, the reviewed studies were conducted in various countries. Four studies (44%) were from the United States, while each of the other studies was from Hong Kong, Israel, Netherlands, Australia, and United Kingdom, respectively (see Table 1). While researchers from a number of countries may be interested in the development of vocabulary, oral language, and/or reading comprehension for children with hearing loss, not many studies on this topic were found.

Intervention Features

The reviewed studies described the intervention agent and setting, intensity of intervention, type of intervention (i.e., vocabulary, oral language or reading), and/or treatment fidelity of intervention features. Table 2 summarizes this information.

Table 2

Intervention Features

Study	Intervention Agent	Setting	Intensity			Type of Intervention	Treatment Fidelity
			Duration (Min.)	Frequency (/week)	Length (Weeks)		
Barker (2003)	Computer-based Technology	School	150-210 total	NR[a]	NR	Vocabulary	No
Fung et al., (2005)	Parents	Home	15-30	2	8	Storybook reading	Yes
Ingber & Eden (2011)	Clinicians	School	20	1	12	Oral language	Yes
Massaro & Light (2004)	Computer-based technology	Clinic	23-30	2	10	Vocabulary	No
Mollink, Hermans, & Knoors (2008)	Speech therapist	School	10	3	3	Vocabulary	No
Paatsch et al., (2006)	Teachers of the deaf	School	20	5	15	Vocabulary + oral language	Yes
Pakulski & Kaderavek (2012)	Reading buddies (younger hearing children)	School	20	4	<1 (4 days)	Storybook reading	No
Pakulski & Kaderavek (2001)	Camp counselors	Summer camp	30	4	<1 (4 days)	Storybook reading	No
Wills & Edwards (1996)	Clinician	Clinic	60-90	20 sessions	48	Vocabulary	No

[a]NR = No Response

Intervention agent and setting. The intervention agent and setting varied across studies. Clinicians or speech therapists implemented the intervention in three studies (Ingber & Eden, 2011; Mollink, Hermans, & Knoors, 2008; Wills & Edwards, 1996). Two studies (Barker, 2003;

Massaro & Light, 2004) used a computer technology as a means of instruction. In the remaining four studies, parents, teachers, camp counselors, and hearing children served as intervention agents, respectively. The majority of studies (56%; n=5) conducted the intervention in classrooms, while four studies employed the intervention at clinics, home, or summer camp.

Intensity. Eight studies (89%) reported the intervention duration per session and seven studies (78%) reported the intervention frequency per week. The total intervention length (weeks) was also reported in eight studies (89%).

The intervention duration ranged from 10 to 30 minutes except in the study of Will and Edwards (1996). In this study, the duration per session was from 60 to 90 minutes. The majority of studies reported that they conducted the studies for about 20 minutes per session. The frequency of interventions per week varied across studies ranging from one to five times a week. Specifically, two studies (Pakulski & Kaderavek, 2012; Pakulski & Kaderavek, 2001) employed the intervention four days a week, while the other two studies (Fung et al., 2005; Massaro & Light, 2004) employed the intervention only two times a week. The remaining three studies reported that they employed the intervention once, three times, and five times a week, respectively. Of the eight studies reporting the total length of the intervention, four studies (44%) employed the intervention from 8 to 15 weeks. Interestingly, two studies (Pakulski & Kaderavek, 2012; Pakulski & Kaderavek, 2001) conducted the intervention only for one week having four intervention sessions. The remaining two studies employed the intervention for three weeks and about a year (i.e. 48 weeks), respectively. Therefore, the majority of the reviewed studies employed the intervention two or four times a week for about 20 minutes for 8 to 15 weeks.

Type of intervention. In the reviewed studies, the vocabulary, oral language, or storybook reading intervention was conducted solely, while one study (Paatsch, Blamey, Sarant,

& Bow, 2006) employed two of the interventions together (i.e., vocabulary and oral language). Five studies (56%) included vocabulary intervention, and three studies (33%) had storybook reading intervention features. Only two studies (22%) employed oral language intervention. As a result, vocabulary was the most frequently employed intervention in the reviewed studies.

Vocabulary. Of the five studies employing vocabulary intervention, two studies (Barker, 2003; Massaro & Light, 2004) used a computer avatar (i.e., Baldi), which provide comprehensive audiovisual speech support to children with hearing loss in order to explicitly and repeatedly instruct vocabulary. The strength of this computer software is that it enables children to receive numerous vocabulary inputs, which is essential to acquire vocabulary. One study (Mollink, Hermans, & Knoors, 2008) taught vocabulary to each child in different conditions including the condition of vocabulary with a sign language, vocabulary with colors, vocabulary-only, and no vocabulary instruction. The vocabulary intervention used by Wills and Edwards (1996) was a listening-focused strategy in authentic communicative situations. The taught vocabulary was selected from each of the children's needs assessment and/or teachers' recommended words lists. In summary, the reviewed studies provided an individual level of vocabulary instruction focusing on explicit teaching, repetition, audiovisual or visual support, and meaningful use of vocabulary in authentic communicative situations.

Oral language. Two studies (Ingber & Eden, 2011; Paatsch et al., 2006) included oral language intervention features. In the study of Ingber and Eden (2011), children practiced storytelling skills using separately and sequentially illustrated picture cards (i.e., the sequence of baking a cake, making a hot chocolate drink, and planting a tree). In the other study (Paatsch et al., 2006), children practiced speech production of phonemes in meaningful context using "words, phrases, expressions, jingles, rhymes, and stories (p. 44)." Both of these oral language

interventions emphasized the authentic and a meaningful context in practicing oral language skills.

Storybook reading. Three studies (Fung et al., 2005; Pakulski & Kaderavek, 2012; Pakulski & Kaderavek, 2001) employed a storybook reading intervention for children with hearing loss. Specifically, Fung and colleagues (2005) used *Dialogic Reading* strategies that were introduced by Whitehurst and colleagues (1988). Compared to the traditional style of shared book reading in which an adult reads while a child listens, the child becomes a storyteller in *Dialogic Reading,* and the adult functions as an active listener and questioner while prompting, expanding, and rewarding the child's contributions (Trivette & Dunst, 2007; Park, 2006). The same authors (i.e., Pakulski and Kaderavek) conducted two different storybook reading interventions in the remaining two studies. One study (Pakulski & Kaderavek, 2012) employed a storybook reading intervention with manipulative features (i.e., felt board cutouts) emphasizing the story sequence while the other study conducted a repeated storybook reading intervention with role-play (Pakulski & Kaderavek, 2001). The storybook reading interventions in the reviewed studies required the child's active participation in becoming a storyteller, manipulating what he learned, or acting as characters of the story. Like some vocabulary and oral language intervention in the reviewed studies, the intervener emphasized repeated reading of the storybook and understanding of the story sequence.

Treatment fidelity. One of the weaknesses of the reviewed studies is the paucity of treatment fidelity information in the majority of the studies. Only three studies (33%) reported the implementation fidelity information. As ways to ensure a higher level of implementation fidelity, Paatsch and colleagues (2006) observed the intervention sessions throughout the whole intervention period. Fung and colleagues (2005) had regular phone calls with interventionists

(i.e., parents), as well as provided parents a calendar checklist to remind them of the intervention schedule. Finally, Ingber and Eden (2011) provided interventionists (i.e., clinicians) continuous training of the intervention even during the intervention period using structural guidance and an instruction booklet. None of the above studies, however, reported implementation data that indicated a certain level of treatment fidelity.

Measurement Outcomes

I analyzed the measurement procedures, overall outcomes, effect size, maintenance and social validity results of the reviewed studies. Across nine studies, the primary dependent variables included vocabulary, oral language, and reading skills (see Table 3).

Measurement procedures. The five studies that included vocabulary intervention features measured receptive vocabulary, expressive vocabulary, and/or oral language skills. Two studies, which employed oral language interventions, documented the results of vocabulary or oral language skills training. Three storybook reading intervention studies reported vocabulary, oral language, and reading comprehension skills of children as intervention results. In summary, vocabulary and oral language interventions measured acquired vocabulary and/or oral language skills, while storybook reading interventions measured relatively more comprehensive language skills of children including vocabulary, oral language, and/or reading comprehension skills.

Table 3

Measurement Outcomes

Study	Variable		Outcomes	Effect Size	Maintenance	Social Validity
	Independent (Intervention)	Dependent (Measures)				
Barker (2003)	Vocabulary	RV[a]	S[d] (d[g])	No	S (d)	Yes
Fung et al., (2005)	Storybook reading	RV	S (st[f])	Partial Eta square d=.276	No	Yes
Ingber & Eden (2011)	Oral language	OL[c] Sequence concept	S (st) S (st)	No	No	No
Massaro & Light (2004)	Vocabulary	RV EV[b]	S (d) S (d)	No	S (d)	No
Mollink, Hermans, & Knoors (2008)	Vocabulary	EV	S (d)	No	S (d)	No
Paatsch et al., (2006)	Vocabulary + oral language	EV OL	S (st) M[e] (st)	No	No	No
Pakulski & Kaderavek (2012)	Storybook reading	OL Reading Comprehension Reading Motivation/Interest	S (d) S (d) S (d)	No	No	Yes
Pakulski & Kaderavek (2001)	Storybook reading	OL	S (d)	No	No	No
Wills & Edwards (1996)	Vocabulary	RV EV	M (st) S (st)	No	No	No

[a]RV = Receptive vocabulary; [b]EV = Expressive vocabulary; [c]OL = Oral language; [d]S = Significant; [e]M = Mixed results; [f]st = standardized measures; [g]d = direct measures (developed by the researcher)

Vocabulary. Vocabulary knowledge was the most frequently measured independent variable in the reviewed intervention studies. Six (67%) of nine studies measured children's receptive and/or expressive vocabulary growth as the result of each of their interventions. Specifically, four (Barker, 2003; Fung et al., 2005; Massaro & Light, 2004; Wills & Edwards, 1996) of these six studies measured receptive vocabulary skills, and three of them documented

children's significant increase in receptive vocabulary skills (Barker, 2003; Fung et al., 2005; Massaro & Light, 2004). Expressive vocabulary skills were also measured in four studies (Massaro & Light, 2004; Mollink, Hermans, & Knoors, 2008; Paatsch et al., 2006; Wills & Edwards, 1996), and children significantly improved their expressive vocabulary skills in all of the four studies. Therefore, children were likely to improve their vocabulary knowledge as the result of the reviewed vocabulary, oral language, and/or storybook reading interventions.

Oral language. Two oral language interventions (Ingber & Eden, 2011; Paatsch et al., 2006) and two storybook reading interventions (Pakulski & Kaderavek, 2012; Pakulski & Kaderavek, 2001) measured oral language skills of children with hearing loss. In regard to oral language intervention, Inger and Eden (2011) measured children's storytelling skills focusing on the sequence of the story and reported significant improvement of children's storytelling skills. Paatsch and colleagues (2006) documented the percentage of consonants correct (i.e., PCC) in words and conversations and reading-aloud skills. The results were mixed indicating children showed significant improvement in reading-aloud and PCC in words, but not PCC in conversations. Both reading interventions (Pakulski & Kaderavek, 2012; Pakulski & Kaderavek, 2001) reported children's storytelling results. Specifically, in Pakulski and Kaderavek's most recent study (2012), children indicated significantly more sophisticated storytelling skills including features of setting, coherence, and sequencing in the "reading + manipulative" condition. Likewise, in the earlier intervention study (Pakulski & Kaderavek, 2001), children more sophisticatedly described learned stories providing the information of "sufficient evidence of story elements, correct order of episodes, appropriate characters, etc. (p.134)" in the "reading + role-play" condition, although children showed improved storytelling skills in the "reading only" condition as well. Overall, both oral language and storybook reading interventions were

effective in improving children's oral language performance including storytelling, speech production, and reading-aloud skills.

Reading comprehension. Only one reading intervention study (Pakulski & Kaderavek, 2012) measured children's reading comprehension skills. The result indicated that children improved their more significant comprehension skills in the "reading + manipulative" condition than the "reading only" condition. In particular, it was noted that children received higher scores in factual comprehension measures than those of inferential comprehension. Although inferential reading scores were lower in both conditions, children acquired higher scores in inferential reading skills in the "reading + manipulative" condition. Therefore, this particular study showed that a storybook reading intervention promoted children's overall reading comprehension skill improvement, and manipulative features added in the storybook reading intervention may accelerate inferential comprehension skills of children with hearing loss.

Maintenance. Three of the nine studies (33%) evaluated how the children maintained their acquired skills after several weeks of completing the intervention. Specifically, Fung and colleagues (2003) measured children's learned word knowledge 32 days after the completion of the storybook reading intervention and found that children retained 55% of their post-test scores. The children received significantly lower scores than on post-test, but still had significantly higher scores than baseline. Massaro and Light (2004) measured the maintenance effects about four weeks after the vocabulary intervention was completed. All the children retained the words that they mastered from the intervention. Mollink and colleagues (2008) measured the retention of acquired words about five weeks after the children completed the vocabulary intervention. The results indicated that children retained most of the mastered words from the post-test (i.e.,

39.3% vs. 36.5%). In summary, children retained 55% to 100% of their learned vocabulary knowledge in the reviewed studies.

Effect size. Although the majority of studies reported significant improvement in the children's vocabulary, oral language, and/or reading comprehension skills, one study (Fung, et al., 2005) documented how significant the intervention effect was (i.e., effect size). The effect size of the DR intervention (i.e., partial Eta squared) was .276 indicating a large effect. The lack of effect size information limited the strength of the intervention effects of most of the reviewed studies.

Social validity. Three of the nine studies (33%) provided social validity information related to the satisfaction or usefulness of the interventions from parents, teachers, and/or children. In the Barker study (2003), the oral school director indicated the computer software vocabulary tutor program was useful because it could consistently expose children to content. Furthermore, several families of the participating children requested the computer software vocabulary tutor program for the use at home or summer camp. Fung and colleagues (2005) reported that parents were satisfied with the storybook reading intervention and noted their children's interest in the program. Pakulski and Kaderavek (2012) asked children their reading motivation and interest before and after the storybook reading intervention. As a result, children indicated significantly higher reading motivation and interest after experiencing the intervention. Although only a few studies reported social validity information, the information that was reported indicated a higher level of satisfaction or usefulness of the interventions from diverse participants (i.e., parents, teachers, or children).

Discussion

The purpose of this study was to identify vocabulary, oral language, and/or storybook reading interventions that effectively improve overall language skills of children with hearing loss who communicate orally. As a result, this research synthesis illuminates the positive language outcomes of children with hearing loss from receiving effective vocabulary, oral language, and/or storybook reading interventions. Children improved their vocabulary, oral language, and reading comprehension skills as the result of the interventions reported in the reviewed studies. Since vocabulary, oral language, and reading skills positively influence children's reading success, this synthesis implies that the interventions are sufficiently effective to improve the children's vocabulary, oral language and reading skills and thus eventually enable those children to become better readers.

Important features of successful vocabulary instruction include explicit teaching, repeated instruction, audiovisual or visual support, and meaningful use of vocabulary in authentic communicative situations. Effective oral language instruction in the studies used the concept of sequential time to generate child's language and emphasized authentic and meaningful contexts in practicing oral language skills. Storybook reading interventions were successful when children actively participated in the reading process. In other words, children became storytellers rather than story-listeners when reading storybooks. They manipulated what they learned using felt board cutouts or acted as characters of the story after reading. Other important features of storybook reading interventions were repeated reading and understanding of the story sequence. Across the above three types of interventions (i.e., vocabulary, oral language, and storybook reading intervention), repeated instruction was the most frequently addressed feature to promote children's overall language improvement.

Although repeated instruction is an important feature of successful interventions for children with hearing loss, it is often difficult to provide the same instruction over again to those children due to time limitation or physical tiredness. The development of computer technology would be able to reduce intervener labor in repeating vocabulary, oral language, or storybook reading intervention as documented in the studies of Barker (2003) and Massaro and Light (2004). The computer software avatar repeatedly teaches incorrect vocabulary to children with hearing loss. The computer technology used in the reviewed studies was only for vocabulary instruction. Therefore, developing diverse computer software programs to implement repeated vocabulary, oral language, or storybook reading interventions for children with hearing loss in order to promote their overall language outcomes is a recommended step.

The majority of the interventions in the nine studies are feasible, given that they do not require significant time to implement. In general, the interventions were implemented for about 20 minutes per session twice to 4 times a week for 8 to 15 weeks. Also, practitioners, parents, and even children expressed their satisfaction or interest in the interventions, although only a small portion of the studies (33%) reported social validity data. In particular, it is meaningful that children themselves reported increased reading motivation and interest as the result of the storybook reading intervention with manipulative features (Pakulski & Kaderavek, 2012)

Implications for Research

First, continuous and rigorous vocabulary, oral language and/or storybook reading interventions are essential for a larger number of children with hearing loss who communicate orally. The small amount of current literature indicates that additional research studies on vocabulary, oral language, and/or storybook reading interventions for children with hearing loss are needed to confirm their effectiveness. It is encouraging that this synthesis found that these

interventions for orally communicable children with hearing loss have gained attention from diverse countries (i.e., U.S.A., Hong Kong, Israel, Netherlands, Australia, and United Kingdom), in spite of the small number of identified studies. In addition, the universal newborn screening and the development of cochlear implant and hearing aid technology continues to enable more children with hearing loss to become oral communicators. Therefore, these interventions will be applicable to a growing number of children with hearing loss from diverse countries.

Second, future studies need to specify the effect sizes of children's language improvement. Effect size indicates the strength of the relationship between vocabulary, oral language, and/or storybook reading interventions and child language outcomes, thus further explicate practical implications. Although all of the nine studies measured child's vocabulary, oral language, and/or reading comprehension skills, only one study (Fung et al., 2005) reported the effect sizes of the vocabulary improvement. No effect size was reported for oral language, as well as for children's reading comprehension skill improvement. Accordingly, a future implication is that researchers should report effect sizes to document the strength of the evidence of vocabulary, oral language, or storybook reading intervention effects.

Third, providing specific information in regard to the fidelity of implementation is imperative for future studies. The fidelity of implementation indicates how satisfactorily intervention agents deliver an intervention. Only when instruction is delivered in the way in which it is intended can the results be regarded as trustworthy. Although the reviewed studies provided some information about implementation fidelity, specific fidelity results were rarely reported. Therefore, future research should measure and report fidelity of implementation.

Implications for Practice

This synthesis provides some practical implication about vocabulary, oral language, and/or storybook reading intervention implementation. First, when implementing these interventions, it is imperative for intervention agents to focus on essential instructional components for children with hearing loss: (a) explicit teaching; (b) repeated instruction; (c) authentic context and experience; (d) visual support; (e) concept of sequential time; and (f) child's active engagement. Including these features in vocabulary, oral language, and storybook reading intervention would enhance children's overall language performance, which further enables children to improve their reading.

Given the fact that the identified interventions require a reasonable amount of time for vocabulary, oral language, and storybook reading interventions, these interventions can be more beneficial when they are incorporated as a daily routine rather than an additional duty or assignment. To routinize interventions, the instruction might become part of a family's daily routine for the parent-child dyad every night for 20 minutes before going to bed. Similarly, specific children who need these interventions can regularly participate in the instruction during preschool routines. The routines-based implementation either in home or preschool would likely result in the child's noticeably improved linguistic performance and reading capability thereafter.

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CHAPTER 3

The Effects of a Tier 3 Pre-Kindergarten Language Intervention on Children with Hearing Loss Who Communicate Orally

Abstract

The prevention of reading disabilities and thus the enhancement of students' abilities to read at or above grade level has become one of the top educational priorities since Congress enacted the No Child Left Behind Act of 2001 (No Child Left Behind [NCLB], 2002). The record is clear that students experience extreme difficulties when expected to read in order to learn in upper-level elementary schools and beyond unless they learn to read in earlier grades. In particular, many children with hearing loss often struggle with primary language skills and are likely to be identified as being at high-risk for developing reading abilities later. The purpose of this study is to examine the effects of a nine-week language intervention on preschool children with hearing loss who are able to communicate orally and identified as needing Tier 3 language support within a Response to Intervention (RtI) model. A repeated acquisition single-subject research design (RAD) was used, and children's word knowledge improvement was measured. As a result, children increased their language skills, although variability in performance was noted. Reasons for variance and implications for future research are discussed.

Keywords: hearing loss, hard-of-hearing, reading, language, intervention, response to intervention (RtI), single-subject study

Chapter 3

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Introduction

The prevention of reading disabilities and thus the increase of students' abilities to read at or above grade level has become one of the top educational priorities since Congress enacted the No Child Left Behind Act of 2001 (No Child Left Behind [NCLB], 2002). Reading success enables children to perform better on complex verbal and higher order cognitive tasks than those children who experience reading failure (Cunningham & Stanovich, 1998). Chard and Kameenui (2000) noted that about 90% of children with poor reading skills in first grade are likely to continue to have poor reading skills throughout their schooling. Later, these students with reading failure are likely to become eligible to receive special education services, which are more costly and less effective than if they were started earlier. Accordingly, prevention of reading failure for young children is critical.

Reading, however, is a complicated procedure that uses cognitive and metacognitive skills including great attention, prior knowledge and experience, clear vocabulary concepts, inferential strategies, and the capacity to connect main ideas (Brown & Brewer, 1996; Vaughn & Linan-Thompson, 2004). In particular, for the majority of students with hearing loss, reading is the most challenging academic skills (Howell & Luckner, 2010). For these students, their restrictions in auditory communication and the perceptual limitations of lipreading as a receptive communication mode for English acquisition, either alone or in combination with listening, make reading particularly difficult for them. (Howell & Luckner, 2010). In addition, according to Wilson and Hyde (1997), the deficits of communication, instructional, linguistic, and experience

are likely to result in relatively few students with hearing loss being able to derive sufficient meaning from text beyond the word level or to comprehend complex text. It is well known that, on average, high school graduate students with hearing loss read at the levels of fourth and fifth graders. As a result, students with hearing loss complete their education without being able to read well (Luckner & Handley, 2008). Fortunately, the universal newborn screening and technology development (i.e., cochlear implant or hearing aids) have enabled the more recent generation of children with hearing loss to have better long-term results regarding language/literacy development which is a critical component for reading success (Spencer & Oleson, 2008).

Vocabulary, Oral Language, and Storybook Reading for Reading Success

Research has reported that both vocabulary/language skills and frequent exposure to reading have enhanced children's reading skills (Crain-Thoreson & Dale, 1999; Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Scarborough & Dobrich, 1994; Wells, 1985; Zevenbergen & Whitehurst, 2003). Dickinson and colleagues (2003), for example, reported the positive relationship between vocabulary/language development and improved reading skills demonstrating that the early development of vocabulary/language of children impacts their reading skills at the early stage of learning to read. A number of studies documented that this relationship also became apparent in children's later elementary school years when fluent reading for understanding is promoted by vocabulary and oral narrative skills (Dickinson & Tabors, 2001; Griffin, Hemphill, Camp, & Wolf, 2004; Scarborough, 2001; Senechal & LeFerve, 2002; Storch & Whitehurst, 2002). Some studies emphasized the significance of children's language development particularly at an early age as the key element of their later reading success (Scarborough, 2001; Snow, Burns, & Griffin, 1998; Whitehurst &

Lonigan, 1998). In addition, several studies noted that children's vocabulary knowledge and oral language skills are foundational skills for reading comprehension and even writing when the child receives formal reading instruction (Biemiller, 2003; Hindson et al., 2005; Lonigan, 2006; Scarborough, 2001; Vasilyeva, Huttenlocher, & Waterfall, 2006). Similarly, researchers have reported frequent storybook reading as an important comoponent for children's reading achievement. Wells (1985), for instance, found that children aged from 15months to 14 years old became better readers when they were exposed to more frequent shared reading experiences. In the study of Zevenbergen and Whitehurst (2003), dialogic reading intervention positively impacted preschool children's later reading comprehension skills, and these effects lasted even to their elementary school years.

Relatively fewer studies have examined the relationships among vocabulary/language development, storybook reading, and reading skills of children with hearing loss. Nonethless, research has reported that vocabulary/language development and frequent storybook reading enable children with hearing loss to read better (Aram, Most, & Mayafit, 2006; Connor & Zwolan, 2004; Fung, Chow, & McBride-Chang, 2005; Johnson & Roberson, 1988; Kyle & Harris, 2010; Pakulski & Kaderavek, 2012; Paul, 1998). In regard to vocabulary/language and reading achievement, Kyle and Harris (2010) found that vocabulary and speechreading skills were predictors of later reading achievement of 29 children with hearing loss from their 3-year longitudinal study. Conner and Zwolan (2004) also found that the stronger language skills children with cochlear implant had, the better reading skills they achieved. In the relationship between storybook reading and reading skills, Pakulski and Kaderavek (2012) reported that children improved their reading comprehension skills through a reading intervention that included manipulative features (i.e., felt board cutouts). Likewise, Johnson and Roberson (1998),

reported that experiential storybook reading intervention for three months positively developed reading comprehension skills of children with hearing loss.

Response to Intervention (RtI) in Early Childhood

Response to Intervention (RtI) is a systematically designed problem-solving process that identifies students' difficulties and needs early, provides students with an intensity level of evidence-based instruction matched to their needs, frequently measures students' outcomes as the result of the instruction implemented, and redirects students to another intensity level of instruction based on their changing needs, as indicated from the ongoing measurement (Greenwood et al., 2011; Reschly & Bergstrom, 2009; Sailor, 2009). RtI has been nationally recognized and accepted as a prevention model of students' academic failure. In particular, the Individuals with Disabilities Education Act (IDEA, 2004) and the Institute of Education Sciences (IES) have endorsed RtI (Reschly & Bergstrom, 2009).

The most common RtI models are three-tier prevention-intervention models, particularly in elementary school programs (Kratochwill, Volpiansky, Clements, & Ball, 2007; Haager, Klingner, & Vaughn, 2007). Studies have reported the effectiveness of reading intervention within a three-tier RtI framework in elementary programs (Haager et al., 2007; Jenkins, Peyton, Sanders, & Vadasy, 2004). Research on RtI, particularly targeting pre-kindergartners is, however, limited. Gettinger and Stoiber (2008) and VanDerHeyden and colleagues (2008) applied an RtI model for preschoolers' literacy interventions and obtained positive outcomes. Those studies, however, did not target children who have hearing loss. The paucity of research about young children compels researchers to investigate the results of language intervention for preschool children with hearing loss within an RtI framework, hypothesizing its effectiveness on the children's language development.

***Reading Ready Language Intervention* (RRLI)**

A four-site research consortium (i.e., Center for Response to Intervention in Early Childhood: CRTIEC) developed the *Reading Ready Language Intervention* (RRLI), using intervention materials and procedures designed to promote language skills for children identified as needing Tier 3 support, the most intensive support, in RtI models.

The RRLI was developed for children who are significantly behind their peers in the vocabulary and oral language acquisition due to a variety of reasons (e.g., English as a second language, speech/language delays, specific language impairments, lack of exposure to enriched language environment, and/or other learning difficulties). These lowest language performing children benefit the most from explicit, comprehensive, and systematic language intervention by focusing on a few essential areas of language skills (Biemiller & Slonim, 2001; Foorman & Torgesen, 2001; Snow et al., 1998; Stahl, 2003). The RRLI intends to assist these children's vocabulary and oral language development so that they can be ready for learning to read in kindergarten. The core features of the RRLI include the following acronym *BRIEF* : (a) *Brief*: RRLI takes 10-15 minutes; (b) *Reading-related*: RRLI focuses on vocabulary and oral language skills through storybook reading; (c) *Intense & Integrated*: RRLI is led by an adult interventionist (i.e., teacher) in a one-to-one or small group setting providing children maximum opportunities of responding and RRLI provides integrated/contextualized instruction to help children make meaningful connections; (d) *Engaging*: RRLI uses professionally illustrated storybooks and various games for child's engagement; and (e) *Focused* : RRLI focus on a few priority skills [i.e., acquiring knowledge of core vocabulary (noun, verbs, descriptive words), and use of the core vocabulary in simple sentences].

The main RRLI materials include a set of nine storybooks which contain fewer words and professionally illustrated pictures, 10 picture cards for target nouns accompanied to each storybook, sequential story cards (i.e., three cards per set in each storybook), game materials, and quick cards which can be used as a quick reference during instruction. The first three books focus on classroom activities, while the second three books and the last three books focus on scenarios in the home and outside, respectively. Children read one storybook each week and thus complete the nine storybooks during nine weeks. For a period of nine weeks, a trained interventionist implements the intervention three times a week for 10 to 15 minutes per session in a designated area of the classroom during Center time.

For the past three years, the research team identified children who needed a Tier 3 intervention based on their initial language scores from the *Individual Growth and Development Indicators* (IGDIs 2.0), *Peabody Picture Vocabulary Test* (PPVT-4; Dunn & Dunn, 2007), and *Comprehensive Evaluation of Language Fundamentals* (CELF-P2; Wiig, Secord, & Semel, 2004) and implemented the intervention using a multiple-baseline single-subject research design to investigate the efficacy of the intervention (Kennedy, 2005). The results indicated that English language learners made the most and quickest progress, while children with an Individualized educational programs (IEPs) for expressive communication delays made the least and slowest progress although their initial language scores were similar before the intervention. During the intervention phase, children were likely to improve vocabulary knowledge more promptly than overall language quality. Among the three different themed lessons (i.e., school, home, and outside-themed lessons), a general trend was that children showed the most growth with the school themed storybooks.

Reading Ready Language Intervention (RRLI) and Children with Hearing Loss

Considering the main features of the RRLI intervention and the positive language outcomes of children with weak language skills in the previous studies, the RRLI has promise for feasibility for use with orally communicable children with hearing loss. Additionally, targeting children with hearing loss would enable researchers to provide more information about the effectiveness of the RRLI.

Multiple rationales exist for using the RRLI with children with hearing loss who are orally communicable.

First, these children are likely to be behind their hearing peers in vocabulary/language development due to their limitation of hearing (Coppens, Telllings, van der Veld, Schreuder, & Verhoeven, 2012; Howell & Luckner, 2010; Kelly, 1996). Second, although most children can learn vocabulary/language incidentally by interacting in their natural environments, children with hearing loss require explicit and intentional instruction to improve their vocabulary/language because of the lack of incidental language learning opportunities (Baker, Simmons, & Kameenui, 1995; Barker, 2003; Crosson & Geers, 2001; Justice, Swanson, & Buehler, 2008; Lederberg & Spencer, 2009; Massaro & Light, 2004; Paatsch, Blamey, Sarant, & Bow, 2006; Pakulski & Kaderavek, 2001; Yoshinaga-Itano & Downey, 1996). Third, repetition of storybook reading and vocabulary instruction not only improve language skills of children with hearing loss but also increase their interests in reading (Barker, 2003; Kaderavek & Pakulski, 2007; Massaro & Light, 2004; pakulski & Kaderavek, 2001). Fourth, the effects of language learning are maximized when children with hearing loss learn the vocabulary/language in meaningful and authentic contexts (e.g., school, home, or outside) (Paatsch et al., 2006; Wills & Edwards, 1996). Fifth, visual support combined with simple written text can promote language development of children

with hearing loss (Barker, 2003; Easterbrook, 1999; Massaro & Light, 2004; Musselman, 2000; Walker, Munro & Rickards, 1998). Sixth, sequential story cards are useful to increase children's understanding of abstract concepts which is a difficult skill for many children with hearing loss (De Feu & Fergusson, 2003; Ingber & Eden, 2011; Marschark, Lang, & Alertini, 2002; Pakulski & Kaderavek, 2012; Passig & Eden, 2003). Finally, children with hearing loss improve their language skills most when they are actively engaged in language activities (e.g., participating to games, using manipulations, role-play, storytelling) (Fung et al., 2005; Kaderavek & Pakulski, 2007; Pakulski & Kaderavek, 2001, 2012). Accordingly, based on the above seven characteristics of children with hearing loss, it is expected that the RRLI would assist children with hearing loss in developing their language skills.

Purpose and Research Questions

The purpose of this study, therefore, was to examine the effects of the RRLI on preschoolers with hearing loss who are able to communicate orally and identified as good candidates for the most intensive language support (i.e., Tier 3 language support) within an RtI model. To advance what we know about the RRLI and children with hearing challenges, I posed the following three research questions related to early language learning of children with hearing loss; (a) What is the effect of the *Reading Ready Language Intervention* (RRLI) on the total word knowledge score [i.e., Word Knowledge (WK) Mastery Test]?; (b) Which of the separate three language skills are most and least improved?; and (c) Is there a relationship between child's hearing characteristics (i.e., degree of hearing and hearing devices) and the three WK Mastery Test scores?

Methods

The following sections provide information about (a) participants involved in the study, (b) setting where the intervention took place, (c) pilot study conducted to examine the feasibility of the intervention for a child with hearing loss, (d) experimental design and procedure, and (e) measurement procedures.

Participants

In order to participate in this study, children should be 4-5 years old and enter kindergarten in the fall of 2014. Children should have uni- or bi-lateral hearing loss ranging from slight (i.e., 16 to 25 dB) to profound (i.e., 91+ dB) levels of hearing loss. The reason to include this wide range of hearing loss is because studies have reported that even minimal hearing loss places children at risk for language and vocabulary development as compared to their hearing peers (Davis, Elfenbein, Schum, & Bentier, 1986; Delage & Tuller, 2007; Wake, Hughes, Poulakis, Collins, & Rikards, 2004). The participating children should use oral language as the main communication method. In addition, children should be able to follow directions in oral English and have the ability to understand the activities presented during the intervention.

Participant recruitment. Upon the Human Subjects Committee- Lawrence Campus (HSC-L) approval, I contacted a number of agencies and private as well as public schools that work with children with hearing loss (i.e., St. Joseph Institute for the Deaf, Kansas School for the Deaf, Schiefelbusch Speech-Language-Hearing Clinic, Hartley Family Center, Kansas Alexander Graham (AG) Bell Chapter, Hearing Loss Association of America (HLAA) Kansas City Chapter, Families Together, and local school districts) and explained the purpose of the study. When the agencies or schools agreed, I followed the necessary approval process in order to get their permission to send a study information letter (see Appendix A) and child/family

information questionnaires (see Appendix B) to the parents of children with hearing loss. A total of eight parents contacted me via email or phone and expressed their interest in this study. Two of their children, however, were too young to get the intervention (i.e., 3 years5 months and 3 years 8 months) and one child was not able to communicate orally. Therefore, the parents of the remaining five children provided a consent form and questionnaires for their child information. In order to test the feasibility of the RRLI intervention for children with hearing loss, one of the five children served as a pilot study participant.

The questionnaire for child/family information included questions regarding child's demographic information (i.e., date of birth, gender and ethnicity), hearing characteristics (i.e., type of hearing loss, communication modality, hearing degree with and without hearing devices, and speech discrimination percentage), and family characteristics (i.e., parent's educational level, marital status, number of family members and monthly income). See Appendix B for the questionnaire sample.

After consents were obtained, I assessed each of the children's initial vocabulary and language skills using *Picture Naming* (PN) IGDI 2.0, *Which One Doesn't Belong* (WODB) IGDI 2.0, PPVT-4 and CELF-P2 in order to confirm that these children were behind their peers in language development and thus needed a Tier 3 level of intervention. In order to be selected, each child got the following score: (a) from 0 to 5 in PN IGDI 2.0, (b) below 85 on both the PPVT-4 and CELF-P2, or (c) below 80 on CELF-P2. All of the five children met the criteria of selection for the intervention and so remained in the study (See Table 4).

Table 4

Child Language Scores before Intervention

Child	Picture Naming (IGDI 2.0)	WODB (IGDI 2.0)	PPVT-4	CELF-P2
1. Patricia	2	11	74	53
2. Kevin	9	6	86	73
3. Brian	5	7	79	61
4. Mary	4	11	82	79
5. Nancy*	3	13	70	61
Mean	4.6	9.6	78.2	65.4
SD	2.7	3.0	6.3	10.4
Range	2-9	6-13	70-86	53-79

*Nancy participated in the pilot study only.

Participant demographics. Tables 5 and 6 summarize each child's demographic information and hearing characteristics. With the exception of Nancy who participated in the pilot study only, all of the other four children were from the same classroom in a local school district where a number of children with hearing loss were enrolled. Nancy went to a private oral-based preschool for children with hearing loss. On average, children were 66.4 months old (SD=3.8, range 60–70), and three of them were female. All children were Caucasians except Nancy who was Hispanic, and all of the children spoke English only both at home and school. All of the children had IEPs focusing on speech and listening skills. None of the children were identified having additional disabilities.

Table 5

Child and Family Information

Child	Gender	Age[a] (Months)	Ethnicity	IEP/IFSP	Language Activities (/week)	Family Member (N)	SES
1. Patricia	F	70	White	Yes	3 or more	3	Middle
2. Kevin	M	68	White	Yes	3 or more	3	Middle
3. Brian	M	66	White	Yes	3 or more	4	Middle
4. Mary	F	60	White	Yes	3 or more	5	High
5. Nancy[b]	F	68	Hispanic	Yes	3 or more	2	Middle

[a]Age when the child started the intervention; [b]Pilot study only

Table 6

Hearing Characteristics of Children

Child	HL[a] Identification (Months)	Type of Hearing Loss	Hearing Device	Hearing Degree w/o HD[d]		Hearing Degree w/ HD		SD[e] w/ HD (%)
				Left	Right	Left	Right	
1. Patricia	41	Sensorineural Bilateral	HA	Profound	Moderate	Moderate	Slight	92
2. Kevin	At birth	Sensorineural Bilateral	CI	Profound	Profound	Mild	Mild	NR[f]
3. Brian	At birth	Sensorineural Bilateral	CI[b]	Profound	Profound	Slight	Mild	90
4. Mary	43	Sensorineural Unilateral	HA[c]	Profound	Normal	Slight	N/A	96
5. Nancy	At birth	Sensorineural Bilateral	CI	Profound	Profound	Mild	Mild	90

[a]HL=Hearing loss; [b]CI=Cochlear Implant; [c]HA=Hearing Aid; [d]HD=Hearing device; [e]SD=Speech discrimination; [f]NR=No Report; Hearing Degree (dB): Normal (-10 to 15); Slight (16 to 25); Mild (26 to 40); Moderate (41 to 55); Moderately severe (56 to 70); Severe (71 to 90); Profound (91+)

All children in this study did language activities at home with their parents (i.e., telling child a story; teaching or practicing letters, words, or numbers with child; or teaching child songs or music; or singing songs with child) three times or more every week. Three of the five children (i.e., Patricia, Kevin, and Nancy) were the only child at home, while Mary had two siblings and Brian had one sibling. The children in the study were from middle or high SES families.

The participating children had a variety of hearing characteristics. Three children (i.e., Brian, Kevin, and Nancy), who had bilateral profound (i.e., 91+ dB) hearing loss, were identified as having hearing loss at birth. Mary, who had unilateral profound hearing loss, was identified as having hearing loss when she was 43 months old. Similarly, Patricia, who had bilateral profound and moderate (i.e., 41 to 55 dB) hearing loss, was identified as having hearing loss at age 41 months. These two children had later identification because they had a better ear (i.e., normal or moderate) compared to the other three children who had profound hearing loss in both ears. All of the children had sensorineural hearing loss which mostly occurs from the damage of the inner ear or auditory nerve.

Three children, who had bilateral profound hearing loss (i.e., Brian, Kevin, and Nancy), had cochlear implantation in both ears, and two children who had better hearing (i.e., Mary and Patricia) wore hearing aids. The starting point of using hearing devices (i.e., cochlear implants or hearing aids) varied across children. Both Mary and Patricia started wearing hearing aids immediately after they were diagnosed as having hearing loss (i.e., 43 and 41 months old, respectively). In regard to cochlear implantation, Brian got his cochlear implants when he was two (i.e., left ear) and six (i.e., right ear) years old. Kevin received cochlear implants when he was four (i.e., right ear) and five (i.e., left ear) years old. Nancy had cochlear implants in both ears when she was three years old. With hearing devices, children increased their hearing

capability, ranging from slight (i.e., 16 to 25 dB) to mild (26 to 40 dB) hearing loss. The percentage of speech discrimination (PSD) with hearing devices was also reported with the exception of Kevin who has not had a formal PSD record yet. On average, children could understand 92% (SD=2.8, range 90%-96%) of what they heard when the sound was loud enough.

Setting

In order to reduce noise distraction and increase the hearing capability of children with hearing loss, I selected a quiet environment at home or school as the intervention setting. With the exception of one child (i.e., Nancy) who participated in the pilot study in her home setting, the other four children participated in the full 9-weeks intervention at their school setting. These four children were from a reverse inclusive classroom of a local school district. Children went to the class Monday through Friday from 8:30 am to 11:30 am. This classroom consisted of seven children including five children with hearing loss and two hearing peers. Children did language activities each day for about 30 minutes. In addition, children with hearing loss attended daily speech therapy sessions both individually and in a group for 30 minutes. The RRLI took place with each of the four children during center or recess time in a small quiet conference room located across from the classroom.

Experimental Design

I employed single-subject repeated acquisition design (RAD) (Kennedy, 2005) for this study. Since children with disabilities often need assistance that is related to each of their unique needs, this single-subject research design is appropriate because it focuses on the individual student as the unit of concern (Horner et al., 2005).

The RAD design assesses the acquisition of academic skills repeatedly in different but compatible experimental conditions when learned skills cannot be reversed. RRLI has alternative

instructional conditions (i.e., Storybook 1 through 9) and the treatment could not be reversed or withdrawn. In addition, the difficulty level of content and target vocabulary of each week's RRLI is compatible. According to Kratochwill and colleagues (2010), three or more replications within participants are necessary to report the effects of a single case design and RRLI provides nine replications (i.e., a series of nine storybooks) within four participants. Each week of the nine-weeks intervention period, I introduced new content (i.e., each storybook reading) and target words (i.e., vocabulary embedded in the storybook) and assessed each child's understanding of instruction (i.e., WK Mastery Test) before starting and after completing each storybook. The accumulated nine-weeks treatment provided the evidence of the instruction effects.

The RAD consists of two conditions - children's performance before starting a storybook was condition A and their performance after completing a three sessions of instruction of the storybook was condition B. I replicated the AB condition across four storybooks for the pilot study and across the full series of nine storybooks for the actual study.

Intervention Procedures

I received two training sessions via webcast from the original RRLI developers. One staff provided a training session about the components of the lessons and appropriate strategies for effective teaching of the RRLI. We also watched a couple of videotaped examples of the RRLI implemented by a trained interventionist, and we confirmed essential components of the intervention with each other. Another staff provided a training session about the components of WK Mastery Test and specific guidelines for scoring. Regarding the WK measure, we assessed inter-scorer reliability among several trained staff through exemplified utterances of children; the reliability on the practice WK scores ranged from 0.84 to 1 (Mean=0.92).

As briefly described earlier, the main RRLI materials consists of a set of 9-series storybooks which are accompanied by 10 flash cards per storybook, one set of sequential story cards per storybook, game materials, and QUICK cards which can be used as a quick reference during instruction of each storybook.

The nine storybooks focus on the story of three animal characteristics (i.e., Bobby, Pablo and Fae) in the classroom (i.e., storybook 1 through 3), home (i.e., storybook 4 through 6) and outside (i.e., storybook 7 through 9). Each storybook is about 17 pages in length and half of the pages are illustrations related to the story content of each page. The story content includes one or two sentences per page (i.e., Bobby can see Pablo and Fae playing in the sandbox.). At the bottom of each content page, comprehension questions are provided in small sizes in order for the interventionist to be able to check the child's understanding about the content. The questions range from simple comprehension questions to more complex cognitive skill required questions so that the interventionist can ask different types of questions according to the child's language level. In other words, the interventionist can ask questions which are direct (e.g., Where is Bobby?), indirect (e.g., What are Pablo and Fae doing?), predictive (e.g., What do you think Pablo and Fae are making?), inferential (e.g., How do you think Bobby feels?), and/or extensive (e.g., Do you like to swing high? How do you make yourself go higher?) according to the child's language skills.

Each storybook has 10 target noun picture cards which consist of common classroom (e.g., pencil, shelf, playdough), home (e.g., closet, stove, bathtub) or outside (e.g., swings, garden, mower) objects (see Appendix C). The RRLI also provides additional targeted vocabulary cards including action words, prepositions, and descriptive words related to each of the target nouns and relevant to the theme. For example, for the target object "crayon" in book 1,

additional words include “draw, color, write, hold, sharp/pointy.” The one set of sequential story cards for each storybook consists of three cards per set. The sequential story cards for each book have stories different from the book but are related to the theme (i.e., school, home or outside), characters (i.e., Bobby, Pablo or Fae), and vocabulary (i.e., target words of each storybook) of that particular book.

The RRLI includes a variety of game materials to motivate children’s interests in the intervention. Each storybook has a LOTTO board which has the pictures of every target nouns on it and can be used for the purpose of various matching games. In addition, each storybook has two generic game boards for the purpose of reviewing each storybook. Additional game materials include number dices, paper clips and fishing pole, laminated character pieces, laminated character faces, and so on. The interventionist does not have to get through every single game, but can choose games that interest each child and increase his or her engagement. Each storybook has a Quick card which assists the interventionist to get through lessons for that particular storybook. Abbreviated description of games, materials and reminders regarding each day’s lesson appears on one side of the card. The other side of the QUICK card provides a list of target nouns, verbs, descriptive words and other related words of the storybook.

I implemented the RRLI three times a week with each of the participating children. Each session of the intervention took about 15 minutes. Each child completed one storybook per week and moved to the next storybook according to the designated sequence of the set of nine storybooks, while the pilot study child completed storybook 1 through 4 for a period of four-weeks. I focused on building children’s core vocabulary knowledge (i.e., noun, verbs, and descriptive words) and assisting children to make sentences using those learned vocabulary. The general procedure of the intervention was: (a) reading the storybook with the child, (b)

introducing vocabulary words, and (c) creating sentences using the learned words in game formats. I used stickers and stamps at the beginning or end of each session to reward each child's participation.

Day 1 and Day 2. Day 1 and Day2 had similar components and procedures of the intervention. In the Day 1 and Day 2 intervention of every storybook, I first read the storybook with an individual child while asking comprehension questions written at the bottom of each page of the book. As described earlier, I asked direct, indirect, predictive, inferential, and/or extensive questions according to the child's language level. After reading the storybook, I introduced 10 nouns embedded in the storybook, and the child learned to make sentences using those words. Again, I adjusted the difficulty of sentences according to each child's language capability. Afterward, the child participated in an oral language game using the nouns, additional verbs, and descriptive words. I was flexible in choosing games according to each child's interests as well as language level. One child, for instance, showed her interest in fishing games which used a small fishing pole and magnet to catch clipped vocabulary cards. Once she "caught" a vocabulary card, I asked her to identify the functions of the word, or to describe whatever she knew about the word. If assistance was needed, I provided examples of features of the word and produced a complete sentence using the word. After she repeated the sentence, I encouraged her to produce a complete sentence using the word for herself.

Day 3. In the Day 3 intervention, across the 9 storybooks, the child became the storyteller while I took the role of an active listener and questioner. While watching each of the illustrated pages, the child told the story of the week based on his or her recollection from the Day 1 and Day 2 intervention. When needed, I provided general or specific prompt questions such as "What happened here?;" "What is Bobby doing?;" Why Pablo set the table?;" "Who read the story for

Fae?;" and so on. The prompt questions varied according to the child's memory of the story and language skills. Then, I continued to encourage each child to tell a story by using a set of three sequential story cards for that particular book with prompting questions if needed. Finally, the child participated in a review game using a generic game board. Usually, the child rolled a number dice and picked up one card at a time from a piled vocabulary cards. Once the child produced a complete sentence using the word, he or she could move a laminated small animal character (i.e., Bobby, Pablo, or Fae) on the game board consistent with the number that appeared on the dice. This pattern lasted until the child reached at the destination.

Measurement

Prior to the study started, I received training sessions to become a reliable assessor in PN IGDI 2.0, WODB IGDI 2.0, PPVT-4, CELF-P2 and WK Mastery Test and became a certified assessor in those measures. Screening measures included those PN IGDI 2.0, WODB IGDI 2.0, PPVT-4 and CELF-P2. In order to measure the direct effects of the RRLI, I administered the WK Mastery Test, which was developed by the RRLI developers, to assess each child before starting and after completing each storybook.

PN IGDI 2.0 and WODB IGDI 2.0. IGDIs are a series of brief easy-to-use general-outcome measures of child status and change over time in the areas of language, phonological awareness, motor, and social skills developed by researchers at the University of Minnesota (McConnell & Missall, 2008). IGDIs 2.0 assessments used in this study include two 15-item tests: (a) *Picture Naming* (PN): Naming pictures of common objects in English; and (b) *Which One Doesn't Belong* (WODB): Identifying the picture that is categorically different within a group of three pictures. During the Picture Naming measure, I asked children to name 15 common items (e.g., tiger, sink, moon) pictured on a note card. The measure is untimed and the

final score is the number of pictures named correctly by the child. The WODB measure asks children to select one of three pictures on a note card that does not belong to a categorically same group (e.g., bus, butterfly, car). The measure has 15 total items and is untimed. The final score is the number of pictures correctly identified.

PPVT-4 and CELF-P2. Both the PPVT-4 and CELF-P2 are standardized measures for pre-kindergartners. The PPVT-4 asks children to point or tell about one of four pictures that the assessors explain in order to measure the children's receptive language. The PPVT-4 is a highly reliable measure demonstrated by internal consistency reliability (i.e., 0.89 to 0.98), alternate-form reliability (i.e., 0.87 to 0.93), and test-retest reliability (i.e., 0.92 to 0.93). The validity documentation was provided by calculating its correlations with several other tests. That is, the mean correlations with different age groups with the *Expressive Vocabulary Test*, Second Edition (EVT-2; Williams, 2007), the *Comprehensive Assessment of Spoken Language* (CASL; Carrow-Woolfolk, 1999), the *Clinical Evaluation of Language Fundamentals*, Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2003), and the *Group Reading Assessment and Diagnostic Evaluation* (GRADE; Williams, 2001), were 0.82, 0.58, 0.74, and 0.63, respectively. In addition, the correlation with the third PPVT-3 (PPVT-3, Dunn & Dunn, 1997) was 0.84

The CELF-P2 consists of three subscales (i.e., Word Structure, Sentence Structure, and Expressive Vocabulary) and measures children's core language skills. In order to obtain reliability information, the CELF-P2 assessed the test-retest stability, internal consistency, and inter-scorer reliability. The test-retest stability of Word Structure, Sentence Structure, and Expressive Vocabulary ranged from 0.77 to 0.92, 0.75 to 0.81, and 0.87 to 0.94, respectively. The internal consistency was stable in Word Structure (i.e., 0.79 to 0.90), Sentence Structure (i.e., 0.69 to 0.85), and Expressive Vocabulary (0.77 to 0.85). The inter-scorer reliability was

0.97 in each of the Word Structure and Expressive Vocabulary subscales, but no information was provided for the Sentence Structure inter-scorer reliability. The comparison with previous versions of CELF (i.e., CELF-P; Wiig, Secord, & Semel, 1992, and CELF-4; Wiig, Secord, & Semel, 2003) provided the validity information. The correlations between CELF-P2 and CELF-P and CELF-4 ranged from 0.55 to 0.70 and 0.61 to 0.86, respectively. In addition, the CELF-P2 has a moderate correlation with the *Preschool Language Scale* Fourth Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002).

Pre- and post-unit WK Mastery Test. The WK Mastery Test is the most direct measure of skills taught during the RRLI lessons. During the WK assessment, the child is asked to name and talk about 10 common objects on picture cards. WK Mastery Test scores include: (a) Naming: A measure of providing a correct name for the object; (b) Number of Features: A measure of how many different features the child mentions when talking about the object (i.e., color, size, and function); (c) Quality of Response: A measure of syntax (i.e., whether the child's response is a single word, short phrase, complete sentence, or compound sentence); and (d) WK Total: The total score combining the three components.

The unit mastery test maintains the same format of assessment across the 9 storybooks but contains a different set of 10 target noun picture cards aligning with each of the 10 different storybooks. The same picture cards are used during intervention and mastery monitoring. The maximum score that a child could acquire in the naming words test is 10 points, one point for each correct word. In addition, a child could earn up to five points for each word when describing features of a particular word. The final score for each word is a maximum of five points for quality of response. Scores can range from one point for a single-word response to five points for a complete, grammatically correct sentence with multiple clauses. Altogether, a child

could earn a maximum of 110 points for the WK total score. I gave credit for correct features and quality of verbal responses regardless of whether the child correctly named the picture. See Appendix D for a sample WK score sheet and WK administration and scoring directions.

In order to establish the validity and reliability of the WK Mastery Test, the consortium researchers obtained the WK concurrent and predictive correlations with the standardized assessments (i.e., PPVT-4 and CELF-P2) and the inter-rater correlations for the WK Mastery Test. The results indicated the correlations with PPVT-4 and CELF-P2 ranged from 0.51 to 0.76 and 0.50 to 0.74, respectively. The inter-rater correlations for each of the three measures (i.e., Naming, Number of Features, and Quality of Response) of the WK Mastery Test were 1, 0.84 to 0.97, and 0.94 to 0.97, respectively. The reliability on WK total score ranged from 0.92 to 0.98.

Control words. In order to increase internal validity, which is an important quality indicator of single-subject research (Horner et al., 2005), children are asked to name two control words per storybook in each pre- and post-test session. If children increased in target words scores but not in control words, they are likely to improve their vocabulary skills from the intervention. In order to select control words, I received the advice of a professor and doctoral student in early childhood special education who both had more than 3.5 years of experience as preschool classroom teachers. The selected control words were compatible with the target words and were not instructed during the intervention (see Appendix C).

Inter-scorer reliability. Prior to administering the WK Mastery Test, I had positive conversations with each of the five children including one pilot study child, and encouraged them to respond with their best effort. Once children felt comfortable speaking to me, I began the assessment. I wrote children's responses on the WK Mastery Test verbatim, while videotaping their responses. A doctoral student in early childhood special education watched the videotapes

and wrote the children's utterances verbatim in order to check the accuracy of children's responses. Once we agreed on the children's responses, I scored each child's responses for Naming, Number of Features, and Quality of Responses in every pre- and post-test. I added the scores of all three measures to calculate a total score (i.e., WK total score). A certified assessor of the WK Mastery Test in the research consortium scored 25% of the WK Mastery Tests for a reliability check.

Treatment fidelity. Fidelity of implementation provides feedback and correction to interventionists related to how satisfactorily the intervention could be implemented. Accordingly, I videotaped 25% of the intervention sessions with each child in order for a trained staff member in the research consortium to measure fidelity of implementation. The fidelity checklist includes the components of: (a) Fidelity of Intervention, (b) Activity Management, (c) Child Behavior, and (d) Setting. See Appendix E for the fidelity checklist and rubric.

Data Analysis

As mentioned earlier, the unit of analysis in a single-subject research design is an individual student. Therefore, in addition to the group based analysis, the study provided information about the intervention for each child across measures (i.e., Naming, Number of Features, and Quality of Response). I graphed the data in several different ways and visually inspected the trend, level, and variability of data. In addition to the visual inspection, I compared the average pre-/post-test scores and computed an average gained scores across measures and participating children. In order to measure the effect size, I calculated the percentage of non-overlap of all pairs (NAP).

Pilot Study

Prior to the actual intervention stating, I conducted a 4-week pilot study with one child to test the feasibility of the RRLI when implementing to children with hearing loss. Specifically, I addressed the following questions: (a) Can a child with hearing loss understand the interventionist's story reading and embedded questions?; (b) Can the interventionist understand the child's oral language?; (c) Is the visual support (i.e., illustrations) clear enough to assist the child's understanding?; and (d) Does the child increase performance in Naming, Number of Features, and Quality of Response?

Procedures. After I sent the consent form and questionnaires to all parents, Nancy's mother first expressed her interest in the study, and I started a pilot study with Nancy. In the initial visit, I explained the purpose and procedures of the intervention to Nancy's mother. During the following week, I administered four vocabulary/language assessments using PN IGDI 2.0, WODB IGDI 2.0, PPVT-4, and CELF-P2 in order to find if she was eligible for a Tier 3 intervention (i.e., RRLI). As seen in Table 4, she had the eligible vocabulary/language skills to receive the RRLI. I visited Nancy's house three times a week after she came back from school and conducted the intervention at the dining table for about 15 minutes per session. Every week, I read one storybook with Nancy, and the storybook reading lasted for four weeks (i.e., first through fourth storybooks). A day before each storybook started, I assessed her with a matched WK Mastery Test was assessed (i.e., pre-test). Likewise, a day after each storybook completed, I assessed her with a matched WK Mastery Test (i.e., post-test) in order to compare the result of each week's intervention.

Results. Nancy was able to understand the storybook reading and answer comprehension questions from each storybook. Her language was intelligible enough to be understood, and she

was able to retell the story by seeing the illustrations of the storybook. She increased target vocabulary scores (i.e., Naming) as the result of each week's intervention while maintaining the same scores in the control words that were not taught during the intervention (See Appendix C for a list of target words and control words). She also increased her capability in describing features (i.e., color, size, and function) of each target word (i.e., Number of Features) as the result of the intervention. Furthermore, she was able to use more complete, grammatically correct sentences (i.e., Quality of Response) after every week's intervention (See Figure 1 for Nancy's WK Mastery Test Scores). The graph indicated that Nancy showed increasing trends 11 out of 12 pre- and post-test occasions (i.e., 92%). As a result, the RRLI intervention was feasible and effective to assist the language development of a child with hearing loss. Accordingly, no revisions were necessary to implement the RRLI for children with hearing loss who are orally communicable.

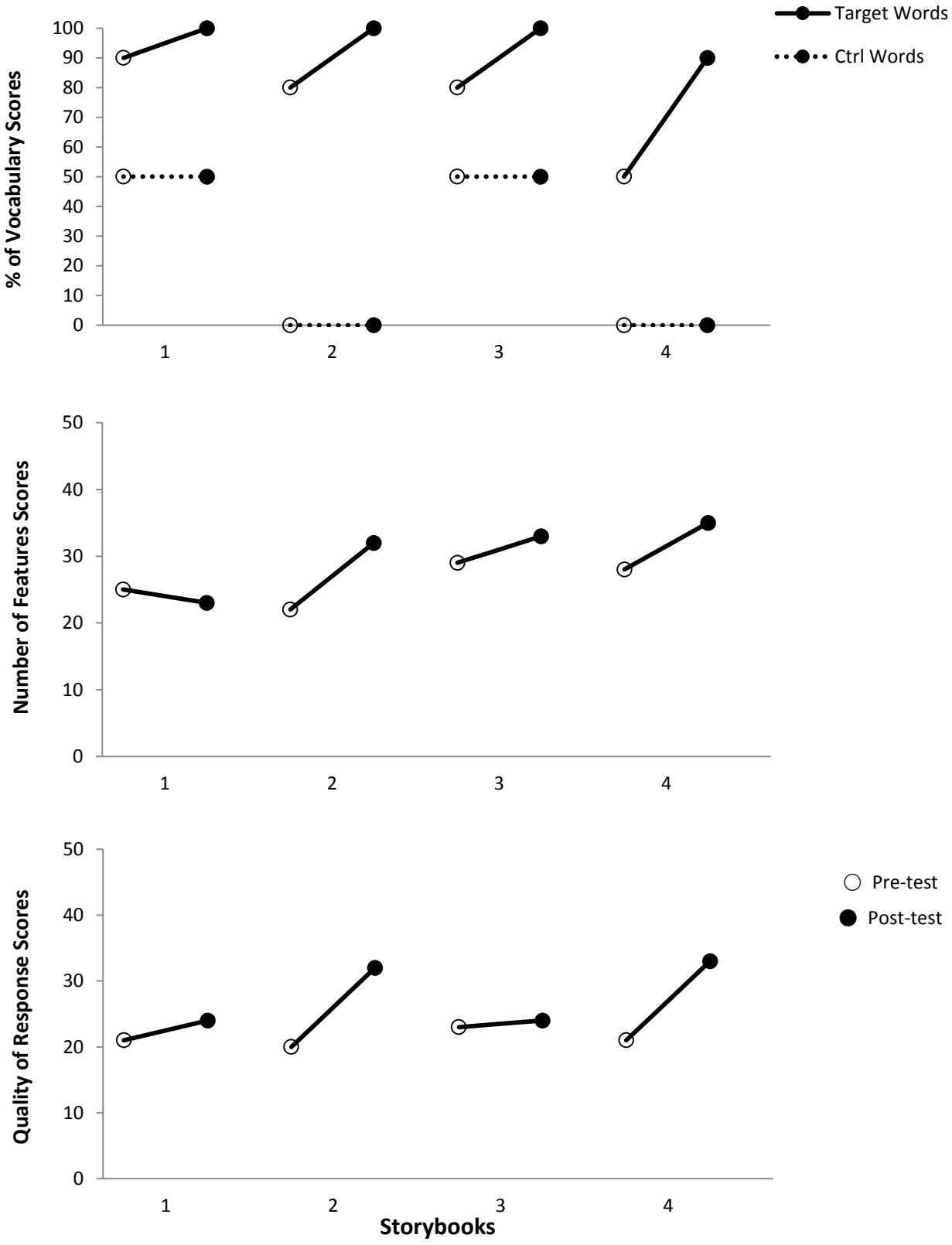

Figure 1. Nancy's WK Mastery Test results.

Results

In the first subsection, I describe the effectiveness of the RRLI by reporting children's achievement in WK total scores by individuals as well as by group. Then, I unpack the WK total scores by Naming, Number of Features, and Quality of Response scores and present children's achievement on each of the three measures. The second subsection compares children's growth in each of the three measures (i.e., Naming, Number of Features, and Quality of Response) by computing the increased percentages of scores in each measure in order to identify the most and least improved skills. The third subsection describes the relationship between children's hearing characteristics and achievement in the WK Mastery Test. Finally, the last subsection addresses treatment fidelity and inter-scorer reliability.

Effects of the RRLI

Children's achievement on the WK Mastery Test, Naming, Number of Features, and Quality of Response are sequentially presented in this subsection.

WK total scores. Children gained an average of 15 points (SD=0.9) in WK total scores per storybook from the mean weekly pre-test (M=44.5, SD=12.4) to post-test (M=59.8. SD=11.2) (see Table 7). The NAP effect size for WK total score was 81% ($CFI_{[90\%]}$ = .73 to .89). According to Parker and Vannest (2009), this indicates a medium effect size for WK total scores. Individual children varied in their gains in WK total scores ranging from 11.3 to 18.7 points. Mary was the most responsive child of the intervention, while Kevin was the least responsive child. Mary has the best hearing with and without hearing devices, and this could influence her best gains in WK total scores. Kevin's lower increase could be the result of the ceiling effect as seen in his Naming graph (see Figure 5). In other words, if there had been more room for improvement in Naming, he may have gained more scores in WK total scores as the result of the

intervention. I will discuss the relationship of hearing characteristics and intervention results in the third subsection. Overall, all four children increased their language skills measured by the WK total scores as the result of the intervention.

Table 7

Children's Word Knowledge (WK) Total Scores and Hearing Degree

	WK Total Scores						Hearing Degree			
	Before		After		Gain		w/o HD*		w/ HD*	
Child	M	SD	M	SD	M	SD	Left	Right	Left	Right
Patricia	43	12.1	58.6	8.8	15.6	14	Profound	Moderate	Moderate	Slight
Kevin	57.7	10.4	69	12.9	11.3	5.4	Profound	Profound	Mild	Mild
Brian	36.7	7.3	52.2	9	14.4	8.9	Profound	Profound	Slight	Mild
Mary	40.8	9	59.4	7.7	18.7	10	Profound	Normal	Slight	N/A
Total	44.5	12.4	59.5	11.2	15	9.9				

*HD = hearing device

As seen in Figure 2, children demonstrated increasing trends from the mean weekly pre- to post-test in overall language skills (i.e., WK total scores) across a series of nine storybooks. Figure 3 is another way to visualize the children's increase from the pre-tests to post-tests; children scored lower on all of the pre-test assessments while always scoring higher on post-test assessments.

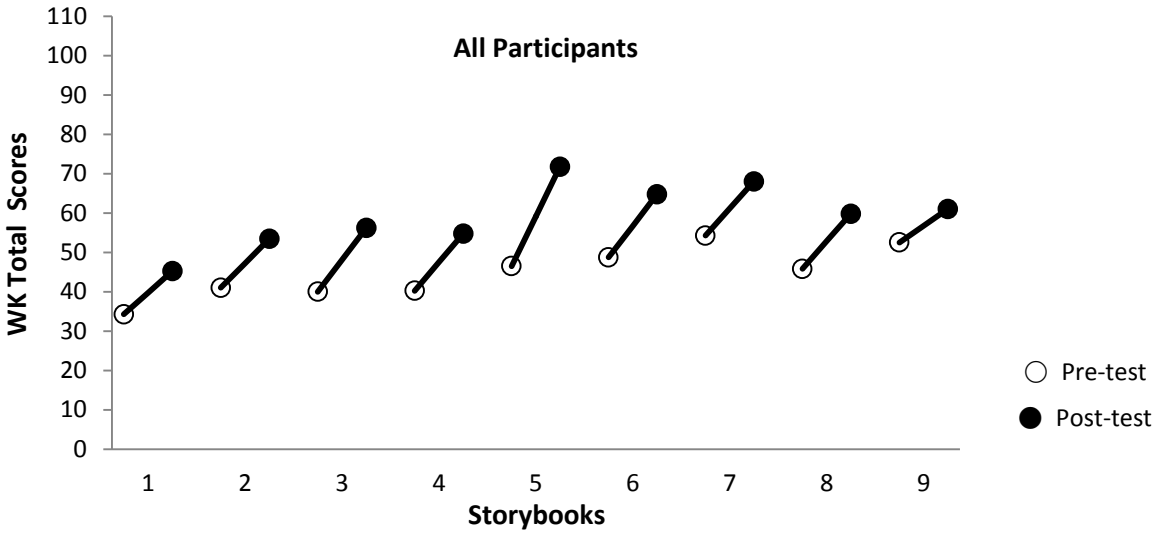

Figure 2. Repeated acquisition design plots for mean WK total scores over storybooks.

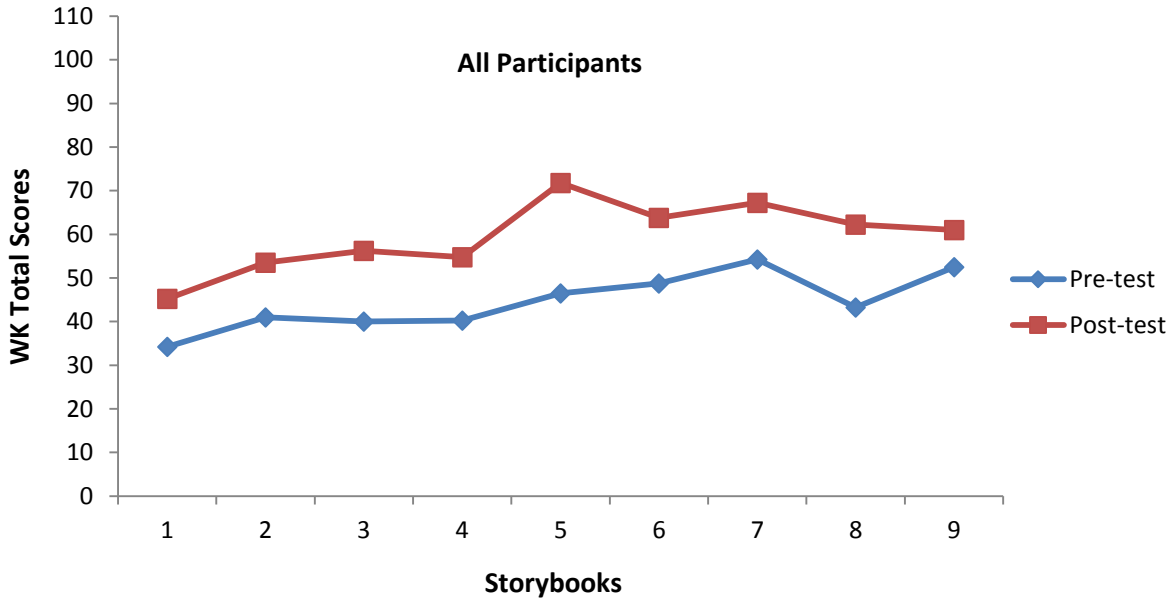

Figure 3. Pre-trajectory and Post-trajectory of the mean WK total scores over storybooks.

Figure 4 depicts each of the children's cumulative gains across the nine storybooks. Again, Mary was the most responsive to the intervention followed by Patricia. As a group, all children positively responded to the RRLI.

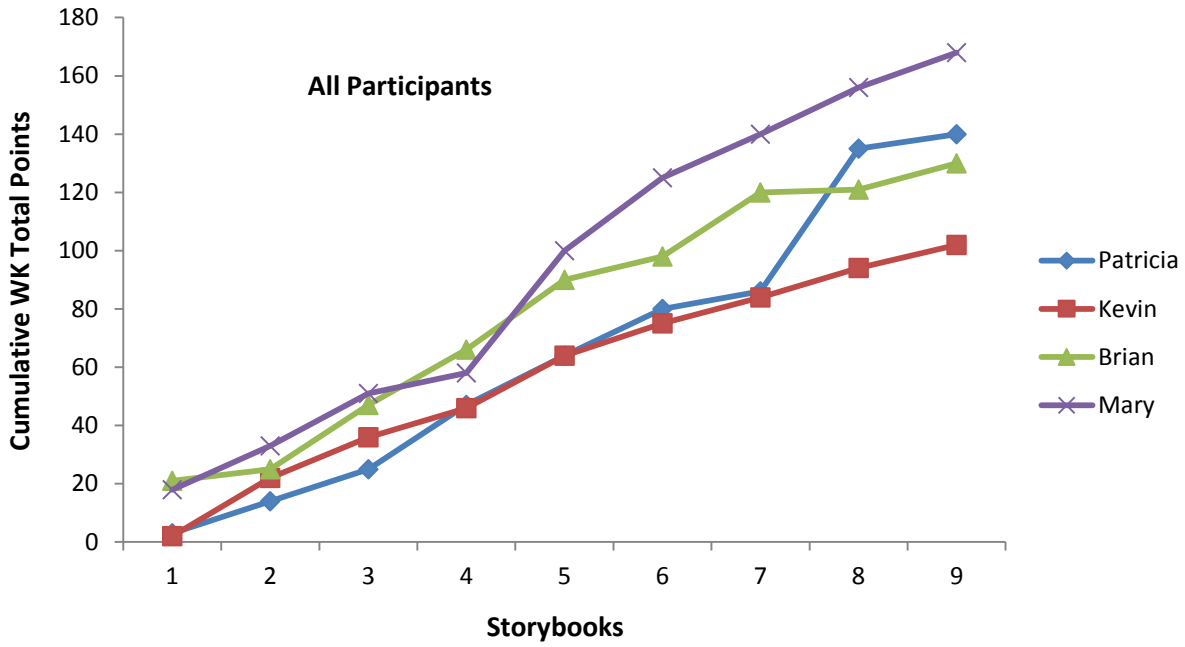

Figure 4. Cumulative WK total points over storybooks.

Naming. Naming measures children's ability to identify target words in each storybook. As described earlier, I assessed the children on two control words in addition to a set of 10 target words in each storybook. In order to compare children's gains in target words and control words, Figure 5 documents the percentage of correct target words and control words in each pre- and post-test. With the exception of four storybook occasions out of 36 storybook occasions for all children, children received the same scores in control words before and after reading each storybook. Simultaneously, children increased their target words scores in most post-test occasions except the occasions when children already received 100% correct in the pre-test and maintained the scores in the matching post-test. Accordingly, children were likely to improve their target vocabulary skills as the result of the intervention while maintaining their control words scores in pre- and post-tests.

The children's Naming scores of children showed a ceiling effect. They scored 100% correct in 30 out of 36 post-test occasions. In particular, Kevin received 100% correct in every

post-test occasion, and Mary received 100% correct in 8 out of 9 post-test occasions. If there had been more opportunity for improvement in Naming, Kevin and Mary likely would have increased more in Naming scores.

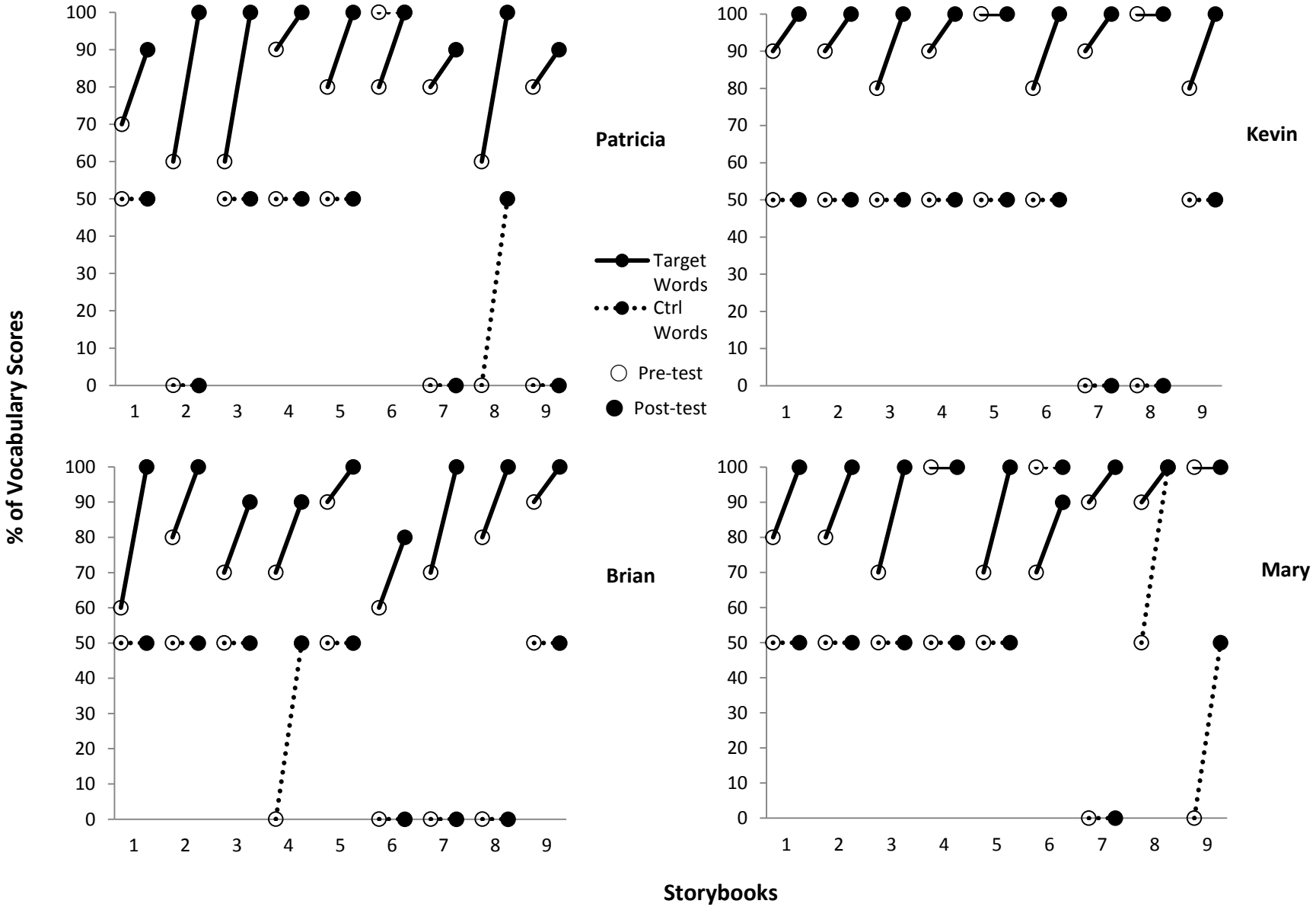

Figure 5. Repeated acquisition design vocabulary plots for each participant.

Number of Features. The percentage of the increasing trends from pre- to post-tests was 89% (i.e., 32 occasions out of 36 occasions) in Number of Features across children. As seen in Figure 6, the repeated acquisition design Number of Features score plots documents an overall increase in children's ability in identifying features of target words in post-tests. The four decreasing trends occurred when children lost interest in doing the intervention because they were pulled out while other children participated in the recess time.

Quality of Response. Similar to Number of Features, children showed an increased performance in Quality of Response post-tests for 32 out of 36 occasions (i.e., 89%). In particular, Kevin had increasing levels even in pre-tests, as well as later in the intervention (see Figure 7). After establishing rapport, Kevin shared many experiential stories regarding target words. Accordingly, he had more opportunities to get correction on his expressions, and this resulted in his higher scores in Quality of Response.

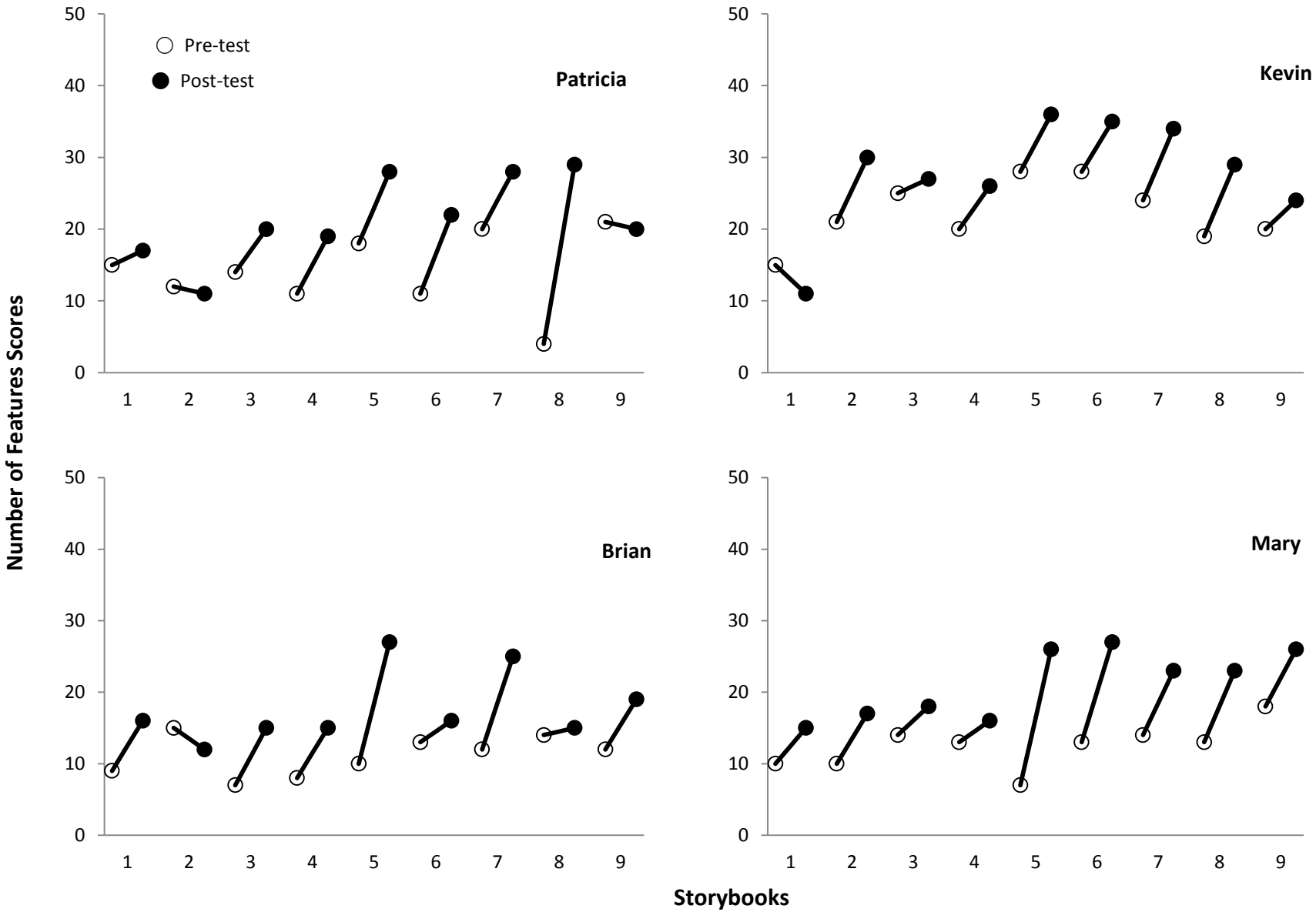

Figure 6. Repeated acquisition design Number of Features plots for each participant.

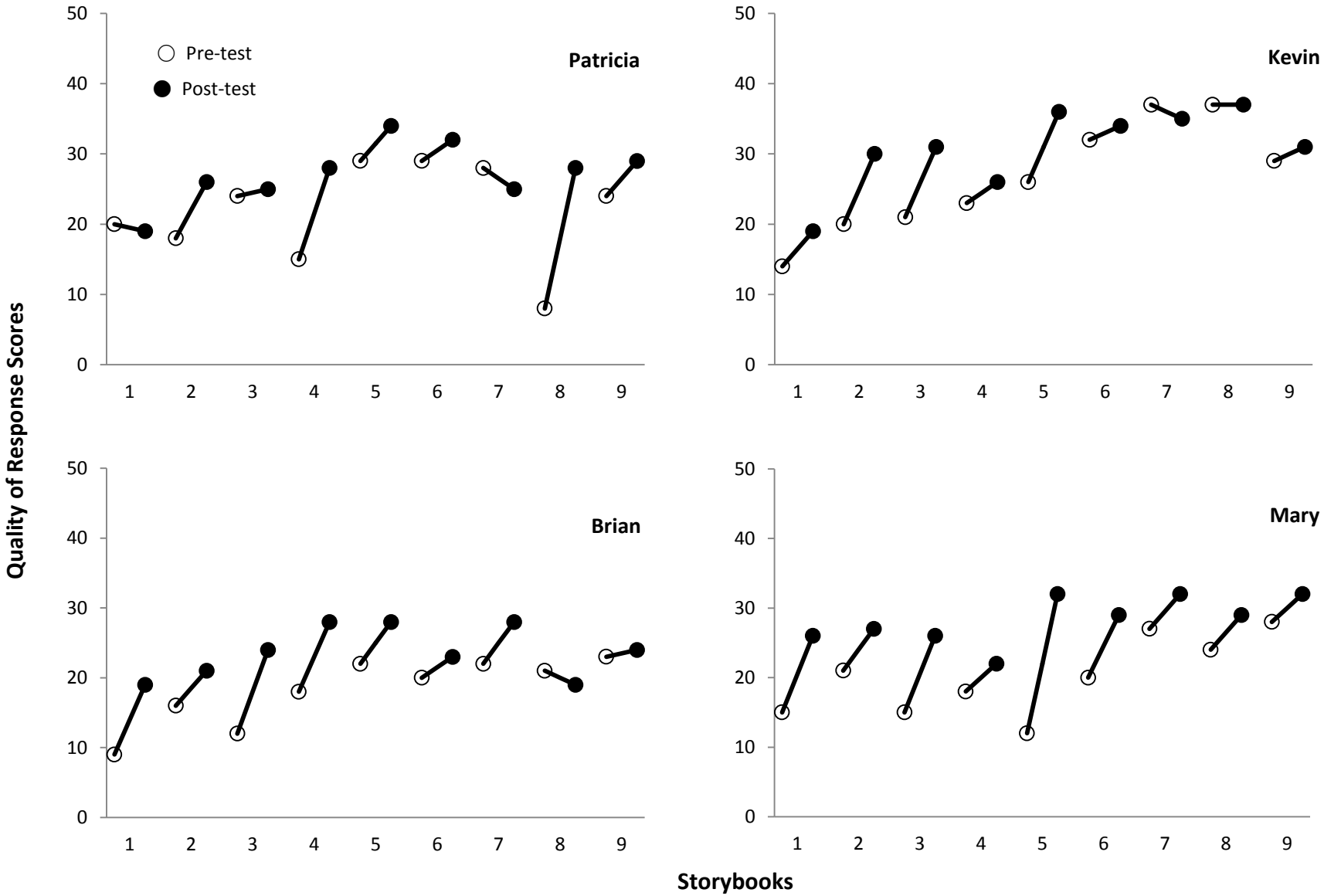

Figure 7. Repeated acquisition design Quality of Response plots for each participant.

Most and Least Improved Skills

In this subsection, I will describe the most and least improved skills for the participating children related to Naming, Number of Features, and Quality of Response.

Naming. On average, children increased from pre-test to post-test for Naming by 18% scoring from 8 points to 9.8 points (see Table 8). The NAP effect size for Naming was 90% ($CFI_{[90\%]}$ = .84 to .96) indicating a medium effect size (Parker & Vannest, 2009). Patricia gained the most (i.e., 2.3 points on average), while Kevin gained the least (i.e., 1.1 points on average) in Naming scores. However, Kevin's initial score was high (i.e., 8.9 points of 10 points) and he achieved 100% of the target words on every post-test. Therefore, if there had been more room for improvement in Naming, Kevin may have improved more in Naming scores. Not only Kevin, but also the other three children, achieved almost 100% correct on Naming post-tests. This ceiling effect limited children's performance in the Naming post-tests.

Number of Features. Children increased Number of Features from pre-test to post-test by 14.4% indicating a mean of 7.2 points increase (i.e., from 15 points to 22.1 points). The NAP effect size for Number of Features was 79% ($CFI_{[90\%]}$ = .71 to .88) indicating a medium effect size (Parker & Vannest, 2009). Kevin achieved the highest mean post-test score (i.e., 28 points) although he gained the least points (i.e., 5.8 points) as the result of the intervention. Mary and Patricia were the most responsive to the intervention indicating the highest score gains in Number of Features (i.e., 8.8 points and 7.6 points, respectively).

Quality of Response. Quality of Response was the least improved skill indicating a 12% increase from pre to post-test (i.e., a mean of 6 points increase from 21.6 points to 27.6 points). The NAP effect size for Quality of Response was 76% ($CFI_{[90\%]}$ = .67 to .86) indicating a medium effect size (Parker & Vannest, 2009). Similar to Number of Features, Kevin gained the

highest mean post-test score (i.e., 31 points) in Quality of Response, although he improved the least (i.e., 4.4 points). Mary responded to the intervention the most scoring an increase of 8.3 points (i.e., from 20 points to 28.3 points) in Quality of Response.

Table 8

Children's Scores in Naming, Number of Features, and Quality of Response

	Naming						Features						Quality					
	Before		After		Gain		Before		After		Gain		Before		After		Gain	
Child	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Patricia	7.3	1.1	9.7	0.5	2.3	1.3	14	5.3	21.6	6	7.6	8	21.7	7.1	27.3	4.4	5.7	7.2
Kevin	8.9	0.8	10	0	1.1	0.8	22	4.4	28	7.6	5.8	4.5	26.6	7.9	31	5.7	4.4	4.6
Brian	7.4	1.1	9.6	0.7	2.1	1.6	11.1	2.8	17.8	5	6.7	6	18.1	4.9	23.8	3.7	5.7	4.6
Mary	8.3	1.2	9.8	0.3	1.5	1.1	12.4	3.1	21.2	4.7	8.8	5	20	5.6	28.3	3.4	8.3	5.2
Total	8	1.2	9.8	0.5	1.8	1.1	15	5.8	22.1	6.8	7.2	5.9	21.6	7	27.6	5	6	5.4

Hearing Characteristics and Children's Achievement

As earlier studies have found (Davis et al., 1986; Delage & Tuller, 2007; Wake et al., 2004), the results of this study indicate that even minimal hearing loss can negatively affect children's vocabulary and language development, and those children are likely to be at risk for delayed vocabulary and language development. For example, children who had better hearing with and without hearing devices (i.e., Mary and Patricia) performed less in pre-tests than Kevin who had the worst hearing with and without hearing devices (See Table 7). Interestingly, Kevin had the richest vocabulary and languages skills before reading each of the storybooks even with his worse hearing status than other participants. Kevin's best pre-test performance was probably due to earlier identification (i.e., at birth) of hearing loss and earlier language support. In contrast, the overall language skills of Mary and Patricia, who had better hearing than other participants, were lower than those of Kevin. If Mary and Patricia had received earlier identification and language support, they could have experienced more opportunities to develop better language skills. Therefore, better hearing with or without hearing devices did not necessarily lead to better language performance, and earlier identification and language support appeared to be a factor that impacted language performance of children with hearing loss.

Even though better hearing itself did not guarantee better language performance, it could positively influence the child's responsiveness to a vocabulary and language intervention. For instance, Mary who had better hearing than other children responded to the intervention the most scoring a mean of 18.7 points increase in WK total scores as compared to the group mean increase of 15 points (see Table 7). Similarly, Patricia who had the second best hearing among the participating children gained a mean of 15.6 points in WK total scores. Although Mary and Patricia were identified as having hearing loss later (i.e., 43 months and 41 months, respectively)

than the other two children (i.e., Kevin and Brian), better hearing may have enabled them to respond to the RRLI better and to, therefore, gain more language skills. Accordingly, providing continuous and intensive language support for children with even minimal hearing loss is significant to increase their language performance.

Inter-Scorer Reliability and Treatment Fidelity

As noted earlier, I wrote children's responses on the WK Mastery Test verbatim, and a doctoral student in early childhood special education independently watched video clips of those assessment sessions to write children's responses. Then, we compared our written responses and watched the video clips again if there was any disagreement. Once we reached a 100% agreement, I scored each of the WK Master Tests. Then, I sent 25% of the total assessed WK Mastery Tests to a certified WK Mastery Test scorer in the research consortium, and she independently scored those WK Mastery Tests. After I received the scored WK Mastery Tests from her, I obtained the percentage of inter-scorer reliability where the total number of agreements was divided by the sum of the total number of agreements and disagreements and then was multiplied by 100%. The reliability average on the score of Naming was 100%, while that of Number of Features and Quality of Response was 87.8% (range 70%-100%) and 92.2% (range 80%-100%), respectively. Finally, the reliability average on the WK total score was 90% (range 90% to 100%).

In order to confirm that I implemented the RRLI as expected and received any feedback/correction on my implementation, four staff in the research consortium who have had experiences in implementing the RRLI with preschoolers conducted a treatment fidelity check on 25% of intervention sessions. I videotaped 25% of the intervention sessions and evenly distributed the burned DVDs to the four senior staff with the fidelity checklist and rubric which

were developed by the consortium researchers (see Appendix E). The fidelity checklist includes (a) 10 items in Fidelity of Intervention section, (b) 5 items in Activity Management section, and (c) an explanatory information checklist in Child Behavior and Setting sections.

I implemented the intervention with 100% accuracy by introducing the lesson, following important procedures, and providing required instruction. In addition, I managed the activities 100% satisfactorily by organizing materials, encouraging child engagement, and providing positive attention to children. Children provided appropriate and accurate responses more than 80% of the time and were highly engaged in activities. Children usually had 3-element sentences (e.g., subject, verb and object) in their language output. The setting was a quite small conference room where no distraction occurred.

Discussion

The purpose of this study was to examine the effects of the RRLI on preschoolers with hearing loss who were able to communicate orally and who were identified as candidates for the most intensive language support (i.e., Tier 3 language support) within an RtI model. As a result of the intervention, children demonstrated medium effect sizes related to improved language skills in vocabulary acquisition, description of word features, and verbal response quality although variability existed by individuals. Specifically, children increased a mean of 15 points (SD=0.9) in WK total scores indicating a mean of 1.8 points (SD=1.1), 7.2 points (SD=5.9), and 6 points (SD=5.4) increases in Naming, Number of Features, and Quality of Response, respectively. In regard to the percentage of increase, children increased from pre-tests to post-tests by a mean of 18%, 14.4%, and 12% in Naming, Number of Features, and Quality of Response, respectively. Children's improvement in Naming scores likely would have been higher if there had not been a ceiling effect.

Earlier identification of hearing loss and level of early language support might be critical components of children's language skills regardless of hearing degree because even children with minimal hearing loss struggled with language development in this study. This finding was consistent with earlier studies in terms of the difficulty experienced by children with minimal hearing loss in terms of vocabulary and language development (Davis et al., 1986; Delage & Tuller, 2007; Wake et al., 2004). However, children who had a better hearing status responded to the intervention better than children who had a worse hearing status, even though the children with a better hearing status were identified as having hearing loss relatively later and so consequently started receiving intensive language support later.

Children in this study were from orally enriched environments (i.e., intensive oral language support from school and home) and so had relatively higher level of vocabulary knowledge as compared to typical preschoolers with hearing loss in the pre-test condition of each storybook (i.e., a mean of 8 points [SD=1.2] out of 10 points). This result was higher than the 4.8 point gain (SD=1.61) reported by a preliminary study conducted by the research consortium mostly targeting English language learners (ELLs) from low SES backgrounds (Hong & Bravo Aguayo, 2012). Accordingly, the orally rich environments might have been a catalyst for language improvement of the participating children.

Intimacy was an important factor in increasing children's language development because it seemed that when a child felt closer with the interventionist, he or she brought more experiential stories to the interventionist and, thus, created an opportunity for the interventionist to provide prompt feedback. For example, Kevin shared a lot of his personal stories regarding target words in later intervention sessions when he became closer with the interventionist. Future research should address whether the intervention will be more effective when it is embedded as a

routine of class instruction and implemented by classroom teachers or para-professionals who already have developed a close relationship with the children. Additionally, parents are also potential interventionists for the intervention because, most of the time, they are likely to have the closest relationship with their children. Parents might implement the intervention as a daily routine within a home setting. If the interventionist is meeting the child for the first time, establishing close rapport before starting the intervention is important to consider because establishing a close relationship with children before the intervention might increase the likelihood that they would converse with the interventionist, and thus the children might be able to increase their overall language proficiency.

Rewards increased children's engagement and different children were motivated by different rewards. Mary, for instance, was excited that she could earn new stickers after each intervention session. Brian, on the other hand, liked a variety of stamps as rewards for participation. Patricia was very active and wanted to do a short "hide and seek" game before starting each session. Due to the length of the intervention, I shortened the "hide and seek" game to about one minute every day, and Patricia became energetic enough to be engaged in the intervention. Kevin was engaged in the intervention very well even without any rewards, so I provided him either stickers or stamps only when he requested them. Accordingly, it is necessary to understand each child's interests and motivation in order to encourage and reward his or her participation.

Children could lose interest in doing the intervention when they were pulled out while other children participated in fun classroom activities (e.g., recess time or center time). Patricia, for example, lost her interest in participating in the intervention when her classmates were making Valentine's cards. Therefore, having the intervention as a class routine rather than

preventing the children from engaging in fun activities would likely result in more positive intervention effects.

Limitations of the Study

Four limitations of the current study are highlighted. First, this study lacks diversity of participants in terms of races, ethnicity, and SES. All of the participating children were European Americans from middle or upper SES backgrounds and received very intensive oral language support from their families, teachers, and speech therapists. Their linguistically rich environments might spur their growth in oral language in addition to the intervention itself. Therefore, their language skills are likely to be better than those of children from low SES backgrounds who might receive less linguistic support. In addition, this study did not include any children who spoke languages other than English; all of the children solely spoke English at home and school. However, considering the growing population of ELLs in the U.S. (Ballantyne, Sandersan, & Levy, 2008; Kirsch, Braun, Yamamoto, & Sum, 2007; School Data Direct, 2007), it is important to examine the effects of RRLI with children with hearing loss who speak other languages at home because this dual language status could negatively impact those children's English language development. Therefore, future studies should implement this intervention with a variety of children with hearing loss including children from other races and low SES, and/or children who speak English as a second language. The implementation results for those children would provide more relevant information regarding the RRLI.

Second, although the universal newborn screening and technology development (i.e., cochlear implant or hearing aids) have enabled more children with hearing loss to become orally communicable, there are still a limited of number of children with hearing loss who are orally focused. This study included only five pre-kindergarten children with hearing loss for the pilot

and intervention study. If a larger number of children can participate in the intervention, more information in regard to validation and generalization of the intervention effects can be provided.

Third, this study did not include follow-up measures due to time constraints. Even though the children in the current study exhibited improved intervention effects in post-test assessments, it is imperative to assess children's language skills over time in Naming, Number of Features, and Quality of Response in order to provide information regarding children retention of the learned skills. In addition, not one-time, but several of assessment times over time will provide richer information about the consistency of the intervention effects on children's language skills.

Fourth, this study lacks social validity data concerning the intervention (i.e., teacher observation of a child's language improvement over the course of the intervention). Reporting information about social validity is another important quality indicator in single-subject research (Horner et al., 2005). Thus, a questionnaire to teachers and/or parents would be an appropriate way to acquire information regarding their own impressions about the intervention as well as the children's meaningful changes as the result of the intervention.

Implications for Research

The results of this study provide several implications for future research. First, for the participating children, there was not enough opportunity for vocabulary improvement (i.e., Naming) given ceiling effects. Alternatively, even though the children increased scores in Number of Features and Quality of Response, there was still plenty of opportunity to improve in those skills. Therefore, the next task to improve the intervention for children with hearing loss is selecting more diverse target and difficult words and developing instructional strategies to enable children with hearing loss to identify features and respond with better sentence structures.

Second, additional implementation of the intervention with a larger group of children with hearing loss from diverse settings (e.g., low SES, ELLs, etc.) is needed not only to support its effectiveness but also to verify if it as an evidence-based practice. More research studies for children with hearing loss who have less oral language support and who come from other races and/or low SES backgrounds could provide richer information regarding the effects of the RRLI for children with hearing loss. In order to be identified as an evidence-based practice in single-subject research, at least five methodologically well-structured studies conducted by three or more different researchers need to report the intervention effects in peer-reviewed journals (Horner et al., 2005). In addition, those studies have to be conducted in a minimum of three different geographical locations having a total of 20 or more participants (Horner et al., 2005). Conducting the intervention across more participants is also important in order to meet the criteria for external validity, which is an important quality indicator of single-subject research in accordance with Horner and colleagues' scholarship (2005).

Third, the control words selected and tested in each pre- and post-test occasion provided valuable information regarding internal validity of the RRLI in children's Naming skills. In order to better evaluate the effects of the RRLI, particularly related to Naming, selecting control words from what children learn from their class instruction is necessary. In that way, it is possible to evaluate how much children learn from the specific intervention and from the general class instruction.

Fourth, researchers can include several follow-up WK Mastery Test measures and a social validity measure in addition to pre- and post-tests. Several follow-up assessments would provide the information regarding consistency of the intervention effects over time. Previous research studies regarding vocabulary, oral language, and storybook reading intervention for

children with hearing loss assessed the maintenance effects approximately one month after they completed their interventions (Fung et al., 2003; Massaro & Light, 2004; Mollink et al., 2008). Social validity information also provides additional information regarding the intervention effects. The feasibility and time availability of the intervention are important factors to implement the intervention successfully. Therefore, a questionnaire or interview with teachers and/or parents would be an appropriate way to evaluate the intervention's social validity. Together, the WK Mastery pre- and post-tests, follow-up WK Mastery Tests, and social validity measure will contribute to understanding the comprehensive effects of the RRLI on children's overall language improvement.

Implications for Practice

Identifying children's hearing loss as early as possible is imperative to provide earlier language support to children with any degree of hearing loss. Furthermore, this language support should be continuously provided for ongoing vocabulary/language development of children with hearing loss. As a means of supporting children's ongoing vocabulary/language development, the interventionists can implement the RRLI with children with hearing loss focusing on: (a) establishing close rapport with children before they start the intervention; (b) understanding each of the children's interests and motivation; (c) incorporating the intervention as a daily routine rather than and additional duty or assignment; and (d) rewarding children's engagement appropriately.

Teachers and parents, therefore, can become successful interventionists because they are likely to have the closest relationship with their children. In addition, teachers and parents are easily aware of the children's interests and motivation. Teachers and parents can implement the intervention as a daily routine; in the home setting, the intervention might become part of a

family's daily routine for the parent-child dyad every night for 15 minutes before going to bed. Similarly, in the school setting, children can regularly participate in the intervention during preschool routines according to teachers' guidance. Because each child is motivated in different ways, appropriate rewards and encouragement can arouse children's interests in the intervention and thus maximize the intervention effects.

Conclusion

The results of this intervention study indicate that children with hearing loss improved their language skills in naming words correctly, identifying features of each word, and producing more qualified verbal responses. Teachers and parents are potential interventionists incorporating the intervention in a daily routine, understanding children's interests, and rewarding children's engagement. The next task of the intervention for children with hearing loss is selecting more diverse and/or difficult words and developing instructional strategies to improve children's skills in identifying features and responding with better verbal quality. In addition, implementing the intervention with a larger group of children with hearing loss may provide additional information regarding the effectiveness of the intervention.

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Appendix A

Study Invitation Letter

The University of Kansas
Tier 3 Language Intervention for Children with Hearing Loss

Hello!
I am Joo Young Hong, a doctoral student in the special education department at the University of Kansas. I have become interested in studying deaf education and family supports for families who have children with hearing loss.
I am preparing for my dissertation experiment and am looking for 4 or 5 preschool aged children (4-5 years old) with hearing loss who communicate orally.

Materials:
In my study, I will do a language intervention with each of the children for about 9 weeks. The materials (9 storybooks and vocabulary cards) were developed by a 4-site research consortium (University of Kansas, University of Oregon, Ohio State University, and University of Minnesota) and have benefitted a lot of children who needed intensive language supports. The storybooks and target words were developed strongly based on research and experiences to promote preschool-aged children's language improvement. I believe that this intervention will help children with hearing loss improve their language.

Procedures:
I am planning to do a pilot study for 1 or 2 child(ren) for about a 4-week period. (If the child wants, I will complete the 9-week intervention after I finish my study.) After pilot, revisions will be made if necessary. Then, I will implement the 9-week intervention with 3 children.

If you give consent, I will give your child assessments of early literacy skills, such as vocabulary and letter sounds. These tests, which take a total of about 40 minutes, will help me learn more about your child's skills. I will break up the testing time into smaller periods to avoid tiring children. These assessments will be repeated after the whole intervention is completed.

Each week during the intervention, your child will use one storybook to learn 10 target words using shared-book reading strategies and fun activities. The intervention will be implemented 3 times a week and at the end of the week (i.e., on Fridays) a child will receive a short assessment for that particular storybook. Each intervention session (3-time a week) and assessment (1-time a week) takes only 10-15 minutes and will be implemented at a designated place of the classroom (i.e., a quiet environment). Once every other week, the intervention will be videotaped in order for my advisor to check how accurately I am implementing the intervention. No preparation is needed for the child or parents.

Risks

I believe there is little risk to you or your child in regard to be involved in this study. If you have any concerns, please feel free to contact me or my advisor (see the contact information at the end of this form). You will decide if you wish your child to participate in this study according to the following information provided for you. Of course, you can choose not to participate in this study. In addition, you may change your mind and decide to withdraw at any time even if you first agree to participate.

Benefits:

This language intervention will provide your child additional instruction to be ready for learning to read in kindergarten.

Payment:

For each participant, I will present a teddy bear with hearing aids at the beginning of the study and a gift card ($50) at the end of the study. I may ask for your social security number in order to comply with federal and state tax and accounting regulations.

Participant Confidentiality

In sharing the information from you or your child, I want you to know that I will protect people participating in my project. Assessments and videos will not include your child's name but will be identified by ID numbers. All information from you and your child will be seen only by me and my advisor, and be kept completely confidential. Also, all information will be stored in a locked file cabinet in my office at the KU Beach Center on Disability until my study is completed at which point it will be shredded.

You may withdraw your consent to participate in this project at any time. You also have the right to cancel your permission to use and disclose information collected about you or your child, in writing, at any time, by sending your written request to: Joo Young Hong, 1200 Sunnyside Dr., Haworth Hall Rm. 3133, University of Kansas, Lawrence, KS 66045. If you cancel permission to use your or your child's information, I will stop collecting additional information about you or your child. If you have any additional questions about your rights as a research participant, you may call (785) 864-7429 or write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email irb@ku.edu.

I hope you and your child can be part of this study and also have a good experience. I will be happy to answer any of your questions. You may call me at 785-550-1555 or email me at spedjyh@ku.edu. If you would like to participate, please sign below. Thank you very much for your time and assistance.

Sincerely,

Joo Young Hong, M.S.Ed.
Beach Center on Disability
Dept. of Special Education
1200 Sunnyside Dr.
Haworth Hall Rm. 3133

Ann Turnbull, Ed.D.
Beach Center on Disability
Dept. of Special Education
1200 Sunnyside Dr.
Haworth Hall Rm. 3111

University of Kansas
Lawrence, KS 66045
(785) 550-1555
spedjyh@ku.edu

University of Kansas
Lawrence, KS 66045
(785) 864-7608
turnbull@ku.edu

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I have read the information in this form (or, it has been read to me), and I have had a chance to ask questions. I have received answers to any questions I had about information that will be used and shared in this study. I know that the information about me and my child will be kept private. I give permission for information about my child to be included in this study, knowing that I can withdraw my consent if I decide to. I also agree to the use and sharing of my information as described above. By signing this, I verify that I am at least 18 years of age and have received a copy of this consent form to keep.

_____ _____

Name of Child (Please print clearly) Child's Birth Date

_____ _____

Parent's Signature Date Signed

Appendix B

Questionnaires for Child & Family Information

*Note: This questionnaires was adapted from CRTIEC Family Survey (2008)

Child's name:_____ (I will delete this once a Child ID has been assigned).

_ _ _ _

Child's name:_____ (I will delete this once a Child ID has been assigned).

_ _ _ _

Child's name:_____ (I will delete this once a Child ID has been assigned).

_ _ _ _

Appendix C

A List of Target Nouns from the Storybooks & Control Words

Storybook	**Target Words**										**Control Words**	
1	Book	Paint	Easel	Paintbrush	Pencil	Tape	Scissors	Glue	Paper	Crayon	Eraser	Marker
2	Toys	String	Puzzle	Playdough	Game	Doll	Bubbles	Blocks	Bell	Beads	Flag	Teddy Bear
3	Backpack	Basket	Carpet	Shelf/ Shelves	Sink	Teacher	Table	Trash/ Garbage Can	Chair	Cubby	Folder	Computer
4	Blanket	Broom	Pillow	Window	Bed	Dresser	Closet	Lamp/ Light	Fan	Box	Couch	Cupboard/ Cabinet
5	Refrigerator/ Fridge	Cup	Napkin	Fork	Spoon	Bowl	Plate	Stove/ Oven	Food	Pan/ Pot	Knife	Microwave
6	Toothpaste	Toothbrush	Hands	Feet	Brush	Mirror	Pajamas	Bathtub	Soap	Towel	Comb	Toilet/ Potty
7	Swings	Playground	(Monkey) Bars	Balloon	Ball	Bucket	Umbrella	Slide	Bike/ Trike	Sandbox	Merry-go-round	See-saw/ Teeter-totter
8	Shovel	Grass	Flower(s)	Garden	Moon	Stars	Sun	Tree	Clouds	Fence	Bush	Plant
9	Sidewalk	Car	Door	Key	House	Mailbox	Mower	Road/ Street	Stairs/ Steps	Stop sign	Hose	Sprinkler

Appendix D

Sample Word Knowledge Score Sheet &

Word Knowledge Administration and Scoring Directions

Word Knowledge Score Sheet: Sample

Child ID: _____ Classroom ID: _____ Assessor: _____ Date: _____

I am going to show you some pictures and I want you to tell me all about them. My turn first. Show picture of hat. ***This is a hat. A hat is something that you wear on your head. Some hats keep the sun out of your eyes. I wear a hat when I go to the beach. Your turn.*** Point to the hat. ***What is this?*** After child responds: ***(This is a hat.) Now, tell me everything you can about a hat.*** After child responds, give prompt: ***What else can you tell me about a hat?***

After child responds: ***Here are more pictures.***

1. paintbrush ***What is this?*** ***Tell me all ... (What do you do with a paintbrush?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
2. tape ***What is this?*** ***Tell me all ... (What do you do with tape?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
3. crayons ***What are these?*** ***Tell me all ... (What do you do with crayons?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
4. glue ***What is this?*** ***Tell me all ... (What do you do with glue?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
5. scissors ***What are these?*** ***Tell me all ... (What do you do with scissors?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
Page 1 Naming: ____	Page 1 Features: ____	Page 1 Quality: ____	Page 1 Total:____	

Notes about Prompting:

1. If the child does not name the picture correctly, say, ***This is a/an _____.***
2. If the child does not respond to the initial question (e.g., tell me everything you can about a/an _____) on the first 3 words, go directly to the follow up question on succeeding words.
3. Sample prompts to be used for *each* word: ***Tell me something else/ What else can you tell me about/ Tell me more about.***
4. Do not continue to prompt if the child does not provide additional information after receiving the prompt on 3 consecutive words

6. pencil ***What is this***? ***Tell me all ... (What do you do with a pencil?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
7. easel ***What is this***? ***Tell me all ... (What do you do with an easel?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
8. book ***What is this?*** ***Tell me all ... (What do you do with a book?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
9. paper ***What is this?*** ***Tell me all ... (What do you do with paper?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
10. paint ***What is this?*** ***Tell me all ... (What do you do with paint?)*** P – ***What else ...?***				
Name 0 1	Features 1 2 3 4 5	Quality of Response 1 2 3 4 5	Notes: G OL U	Total:
+	Page 2 Naming: ____ Page 1 Naming: ____	Page 2 Features: ____ Page 1 Features: ____	Page 2 Quality: ____ Page 1 Quality: ____	Page 2 Total: ____ Page 1 Total: ____

= **Naming Total: _____** **Features Total: _____** **Quality Total: _____** **Overall Total:_____**

Notes about Prompting:

1. If the child does not name the picture correctly, say, ***This is a/an _____.***
2. If the child does not respond to the initial question (e.g., tell me everything you can about a/an _____) on the first 3 words, go directly to the follow up question on succeeding words.
3. Sample prompts to be used for *each* word: ***Tell me something else/ What else can you tell me about/ Tell me more about.***
4. Do not continue to prompt if the child does not provide additional information after receiving the prompt on 3 consecutive words

Reading Ready Language Intervention: Year 5

Word Knowledge Administration and Scoring Directions

What is Word Knowledge?

Word Knowledge is a preschool measure of vocabulary and oral language skills, specifically of the child's knowledge of common preschool words and the ability to use the words in simple sentences with correct sentence structures and syntax. Vocabulary and oral language skills are a foundational critical skill for children entering school (Biemiller, 2001; National Institute for Literacy, 2008; National Research Council, 1998; Chard & Kameenui, 2000).

Using standardized procedures, the assessor shows the child a series of 10 pictures of common nouns one at a time, and asks the child to name the object in the picture and to tell everything he/she can about the object. The assessor writes the child's response verbatim, and scores whether or not the child correctly names the object (0-1 point) and the number of features the child provides (0-5 points). The assessor also rates the child's quality of response (0-5 points) and adds all of the scores to compute a total score (0-11 points).

Building Rapport

Assessors should converse briefly with the child prior to beginning the assessment in order to establish a positive relationship in which the child feels comfortable speaking and encouraged to respond to the best of his or her ability. A general guideline to follow is to begin the assessment when the child demonstrates that he/she is comfortable talking to the assessor.

Engaging the Child

The measure is designed to be conversational so that it is comfortable for the young child. Recommended wording for directions and prompts are provided; however the assessor may adjust wording to be responsive to the child's behavior and needs (Sandall, McLean, & Smith, 2000) as well as to maintain a conversational feel during the assessment.

The use of encouragement is recommended in order to maintain child engagement. Generous praise should be given to all children during the assessment, regardless of whether the child is giving correct responses. In keeping with best practices in assessment administration, praise should be limited to encouragement of child participation, rather than statements that indicate whether the child responded correctly to an item. Corrective feedback on incorrect items is not appropriate during the assessment.

The following forms of encouragement are permissible on Word Knowledge:

- Repeating verbatim what the child says. For example, for the word *crayon*, the student says, "write with it." Assessor says, "Write with it. What else can you tell me about a crayon?"
- Using general praise. For example, for the word *crayon*, the student says, "write with it." The assessor says "Good. Tell me something else you can do with a crayon."
- Commenting on the good effort of the student. For example, for the word *crayon*, the child says, "I write my name with a crayon. I can color a picture and I can make a rainbow with all different colors." The assessor says, "You told me a lot about a crayon! Anything else?"

It is important that all children have the same opportunity to respond to each form. No student should receive more or less encouragement than other students.

Materials

- Picture cards
- Pen/pencil
- Optional: stickers
- Score form
- Clipboard

Administration Directions

The administration for each word has two parts: 1) naming the picture and 2) telling about the word.

Introduce the task: Place the Word Knowledge scoring sheet on the clipboard so the child cannot see what you record. Show the sample picture and say:

> ***I am going to show you some pictures and I want you to tell me about them.***

Practice item:

> ***My turn first.*** Show sample picture and say the directions for the sample item on the form. For example, ***This is a hat. A hat is something that you wear on your head. Some hats keep the sun out of your eyes. I wear a hat when I go to the beach. Your turn.*** Point to the hat. ***What is this?*** After child responds*: ***Now, tell me everything you can about a hat.*** (*If the child does not name *hat*, say, ***This is a hat.***)

If the child says at least one thing about the word/item in the picture:	If the child does not respond or says something not relevant to the picture:
* Give a prompt such as ***Tell me something else; What else can you tell me about a hat? Tell me more about a hat. What else do you know about a hat?***	Ask the follow-up question for the noun pictured. If the child says at least one thing about the word/item in the picture give a prompt such as ***Tell me something else; What else can you tell me about a hat? Tell me more about a hat. What else do you know about a hat?***

* If the child does not name *hat*, say ***This is a hat.***

Begin testing. Say: ***Here are more pictures.***

Part 1 - Picture Naming

Show each picture and pause. If the child does not name the picture, ask the designated initial question (e.g., ***What is this; what is she holding?).***

Part 2 – Telling about the picture

Ask the child to tell you all about the object/item depicted. (If the child has not correctly named the picture, say, ***This is a/an ____,*** then ask the child to tall you all about the object/item depicted.) Vary your language for each word using suggested language such as:

Tell me all about a/an ____.
Tell me everything you can about a/an ____.
Tell me everything you know about a/an ____.
Tell me what you know about a/an ____.

If the child says at least one thing about the word/item in the picture:	If the child does not respond or says something not relevant to the picture:
Give a prompt such as ***Tell me something else; What else can you tell me about a ____? Tell me more about a ____. What else do you know about a ____?***	Ask the follow-up question for the noun pictured. If the child says at least one thing about the word/item in the picture give a prompt such as ***Tell me something else; What else can you tell me about a ____? Tell me more about a ____. What else do you know about a ____?***

***Notes about prompting/follow-up questions:**

- If the child does not respond to the question, ***tell me everything you can about (a/the)*** **____** on the first 3 questions, go directly to the follow-up question for the remaining words.
- Do not continue to prompt if the child does not provide additional information after receiving the prompt on 3 consecutive words.

Recording child responses

1. As the child is responding, write the child's response verbatim.
2. Put a slash (/) between each utterance.
3. Mark a P when you provide the prompt.

An utterance is a vocalization with at least one of the following characteristics:

- a drop in intonation signifying the end of the utterance
- pauses of at least 1 second at beginning and end
- constituting a single semantic unit or idea

Below are some examples. Keep in mind that the decision to mark an utterance is made in the moment, and is based in part on the child's intonation and pauses.

Paint. you can paint in your hair / and rain and sun

Paint. you can paint all of the pictures

Tape. you can fix something / somebody's house

Easel. you can paint everything / like rainbow

Flowers. we like flowers / flowers smell good

Tree. a christmas tree / we decorate

Swings. when you want to get off the swing you need to push yourself

Bike. you can get a bike / and ride it

Scoring

There are 4 scores for Word Knowledge: 1) Picture naming, 2) Features, 3) Quality of Response, and 4) Total Score.

1. Picture naming

If the child correctly names the picture, circle 1 in the "word" column. A correct name is any of the words listed on the score form for the picture.

2. Features:

Score 1 point for each feature/example provided for the word. The following count as features/examples:

- The child may tell what you do with it, (e.g., *smock*: put it on; wear it).
- The child may tell how, where, when, or why you use something (e.g. *smock*: over your clothes, in school, when you are going to paint, to keep your clothes from getting paint on them).
- The child may tell *who* uses something. The child receives a point for each specific person named (e.g., "my mom cuts with scissors."). The child does not receive a point for a feature for a general pronoun (e.g., you cut with scissors; he cuts out snowflakes).
- The child may describe how it feels, looks, sounds, smells, tastes e.g., what size, color, shape, texture, or what it is made out of (e.g., a *pencil* is sharp; *glue* is sticky; a *house* is big; a *shovel* is metal).
- The child may name the parts (e.g., a *shovel* has a handle; a *house* has windows, doors, a roof, and a chimney.
- The child may give an example of something it is like (e.g., a *smock* is like an apron; a pencil is like a crayon).
- The child may name a superordinate category, e.g., *scissors* are a tool, a *banana* is food.

Note: The maximum number of features is 5. For example, if a child says that an apple is a fruit and lists 6 other fruits, each fruit named would count as a feature, but the child would not achieve a score greater than 5.

Examples:

Stove. A stove is something you cook on[1]. It is hot[2]. It is made of metal[3]. I can make soup[4] on it. Number of features = 4

Stove. You can cook on it[1]. It makes food hot[2-3]. I can cook soup[4] on it, and spaghetti[5], and sauce[6], and hotdogs[7]. Number of features = 5

Scissors. You cut[1] with scissors. They are sharp[2]. My mom[3] makes paper dolls[4] with them. Number of features = 4

Prepositional phrase (typically describes where, when, how, to or for whom or what)	• I threw the ball *to the boy.* • The cat is *under the chair.* • She gave the book *to him.* • She put the *ball in the basket.* • He drove *under the bridge.*

1 point responses

A 1-point response is any single word that is related to the target word. A 1-point response may be any part of speech as long as the word conveys some information related to the target word.

pencil: "write" "crayon" "paper" "school" "sharp"

stove: "cook" "pot" "spoon" "kitchen" "hot"

scissors: "cut" "knife" "paper" "school" "sharp"

gate: "fence" "open" "animals"

2 point responses

2-point responses include 2-element phrases and sentences and incorrect simple sentences

Phrases

A phrase is a group of words containing two elements that stands together as a conceptual unit, but that does ***not*** include ***both*** a subject and a verb.

pencil: "pencil write" "write with" "write with pencil" write paper" "write on paper" "on the paper"

scissors: " scissors cut" "cut with" "cut with scissors" "cut paper" "sharp scissors"

stove: "hot stove" "cook stove" "cook on a stove"

Two-element sentences

Two-element sentences are brief sentences (typically 2 – 4 words) that include both a subject and a verb.

pencil: "A pencil can write." "I write."

stove: "Mom cooks." "I can cook." "Soup cooks."

scissors: "I cut." "I can cut." "Scissors can cut."

Incorrect simple sentences

Incorrect simple sentences are 3-element utterances that include a subject and a verb but are grammatically incorrect.

pencil:

"pencil is pointy" ("A pencil is pointy.")

"I write pencil" ("I write with a pencil.")

"teacher write paper" ("A teacher writes on paper.")

"me write with a pencil" ("I write with a pencil.")

3 point responses

3-point responses include grammatically correct simple 3-element sentences and incorrect expanded or elaborated sentences (4+ element utterances/sentences)

Simple 3-element sentences

scissors: "I cut paper."

scissors: "I cut with scissors."

scissors: "I can cut with scissors."

scissors: "I cut on a line."

scissors: "The scissors are sharp."

scissors: "I cut carefully."

Incorrect expanded or elaborated sentences/4+ element utterances

door: "You open and close and put in."

scissors: "When there paper you can cut."

4 point responses

4-point responses include grammatically correct sentences that contain 4 elements.

Expanded simple sentences (simple sentence + 1 element)

pencil: "I write with a pencil at school"

scissors: "I cut a straight line."

*scissors: "*I cut carefully on the line."

scissors: "My mom and I cut out paper dolls."

scissors: "The scissors are sharp and pointy."

5 point responses

5-point responses include grammatically correct senteces that contain 5+ elements.

Elaborated simple sentences (simple sentence + 2 or more elements)

scissors: "My mom and I make paper dolls with scissors."

scissors: "My mom and I make pretty paper dolls with scissors."

scissors: I cut out the dolls and I hang them up in the room."

scissors: "The scissors are sharp so my mom helps me to cut."

scissors: "I cut out the snowflakes with scissors and then I hang them in the window."

scissors: "When I want to cut something, my mom helps me."

scissors: "I am not allowed to run if I am carrying scissors."

Selecting the utterance to score

When scoring Quality of Response, score the most complete utterance within the child's response that obtains the best score. In the following examples, the most complete utterance that obtains the best score is in bold.

Paint. **you can paint in your school** / and rain and sun

Tape. **you can fix something** / somebody's house

Easel. **you can paint everything** / like rainbow

Flowers. **we like flowers** / **flowers smell**

Tree. a christmas tree / **we decorate it**

Bike. **you can get a bike** / and ride it

Sandbox. you need a bucket / **you want a bucket to put sand in**

Toys. you can play with the toys / you can clean up the toys when you are done

---

Notes

If the child uses a gesture that conveys the meaning of the word, circle the G.

If the child provides a word in a different language, circle OL. It is permissible to prompt the child to respond in English by saying, ***"Tell me in English."*** Use judgment regarding the need for and appropriate number of times to prompt for an English response.

If the response is unintelligible, circle U.

Appendix E

Fidelity Checklist & Rubric

Y5 Reading Ready
Intervention Fidelity Checklist: Language

Score: _____
Possible: _____
% Fidelity:_____

SID: _____ Observer: _____ Date: _____Time: _____to _____

Interventionist: _____ Story: _____ Day:_____

Scored Live: Y / N Scored by Video: Y / N Note: Y = Yes. P = Partial. N = No. NA = Not Applicable.

Fidelity of Intervention	Y	P	N	na	Notes
1. Teacher introduces the lesson and story.					
2. Teacher reads the story, appropriately pausing to ask questions (Days 1 and 2) or has child retell the story (Day 3).					
3. Teacher introduces/reviews target nouns (include review nouns on Day 3).					
4. Teacher plays language game(s) with child (Noun, Verb, and/or Descriptive Game on Days 1 and 2, and a Review Game on Day 3.)					
5. Teacher uses a variety of prompts effectively to elicit oral language.					
6. Teacher models vocabulary and language forms effectively to elicit language and increase child's oral language skills.					
7. Teacher uses language expansions and extensions effectively to elicit language and increase child's oral language skills.					
8. Teacher uses follow-up questions effectively to elicit language and increase child's oral language skills.					
9. Teacher follows the child's lead, (Observes, Waits, Listens) and responds contingently, expanding or extending child's language.					
10. Teacher provides 6-12 opportunities per minute for each child to respond during the activity.					
Activity Management (Check all that apply)					
1. Teacher engages the child and gets into the lesson quickly. Reminds child of Reading Ready rules as needed.					
2. Materials are ready and organized.					
3. Teacher proactively provides positive attention to child for attention and appropriate behavior.					
4. Teacher paces lesson to maintain attention.					
5. Ratio of positive teacher attention for appropriate behavior to attention for misbehavior is at least 5/1.					

Child Behavior	Notes
Accuracy of responses (Check one) ☐ => 80% appropriate/accurate responses ☐ 40% - 80% appropriate/accurate responses ☐ =< 40% appropriate/accurate responses Level of engagement (Check one) ☐ Was highly engaged with activities ☐ Generally attentive and engaged, occasionally had difficulty ☐ Had difficulty attending/keeping engaged Language abilities (Check one) ☐ Expanded/elaborated sentences ☐ 3-element sentences ☐ 2- to 3-word phrases ☐ 1 word responses ☐ Nonverbal	
Setting	**Notes**
Describe: Level of Noise/Distraction of Setting ☐ Quiet and nondistracting ☐ Generally quiet, occasional distractions ☐ Noisy and highly distracting	

Y5 Reading Ready
Intervention Fidelity Checklist: Language

Fidelity of Intervention	Rubric
1. Teacher introduces the lesson and story.	Y = Teacher introduces the lesson by telling child what they will do today (e.g., "Today we are going to read a story and play some fun games.) Teacher introduces the story by showing the cover and reading the title to the child. P = Teacher does 1 of the above or does both but not as described above (e.g., shows the story but does not read the title). N = Teacher does not do either.
2. Teacher reads the story, appropriately pausing to ask questions (Days 1 and 2) or has child retell the story (Day 3). (Target number of questions is 4-6; however teacher should be responsive to child and ask fewer if child is unresponsive; ask questions if child is responsive and engaged.)	Y = Teacher pauses to ask questions when reading or having the child retell the story in a manner that feels natural and engages the child. The child is actively engaged and responds appropriately to most questions. P = Teacher pauses to ask questions, but child does not answer; or teacher only asks one or two questions to which child responds appropriately. N = Teacher does not pause to ask questions or retell the story.
3. Teacher introduces/reviews target nouns (include review nouns on Day 3).	Y = Teacher introduces/reviews target nouns, using a variety of prompts to have child name target noun pictures. This may be done by showing pictures or in a game format, but should take 1 to 2 minutes or less. P = Teacher introduces/reviews only some target nouns. Teacher introduces/reviews target nouns in a manner that takes longer than 2 minutes and loses child's interest. N = Teacher does not introduce/review target nouns.
4. Teacher plays language game(s) with child (Noun, Verb, and/or Descriptive Game on Days 1 and 2, and a Review Game on Day 3.)	Y = Teacher plays language games that are appropriate for child's level of language. Child is actively engaged and responsive. P = Teacher plays language game, but the game is clearly not appropriate for child's level of language. For example, child is able to speak in simple sentences and the focus of the game is naming single words. N = Teacher does not play language game.
5. Teacher uses a variety of prompts effectively to elicit oral language.	Y = Teacher uses a variety of prompts to elicit language, including any of the strategies on pp 16 – 18 of the RRLI Teacher's Guide. The prompts elicit oral language from the child most of the time. P = Teacher uses a variety of prompts in some activities, but not in others. N = Teacher uses the same prompt to elicit language throughout the lesson, e.g., repeatedly asks, "what is this? What do you do with it?"
6. Teacher models vocabulary and language forms effectively to elicit language and increase child's oral language skills.	Y = Throughout the lesson, teacher models vocabulary and language forms for the child to imitate. Teacher consistently models language forms that are appropriate for the child's language level (e.g., +1 element). P = Teacher models vocabulary and language forms for the child to imitate, but is inconsistent in modeling forms that are appropriate for the child's language level. Sometimes the forms are too simple or too complex. N = Teacher does not model language forms at all, or models language forms that are consistently either too simple or too complex for the child's language level.

7. Teacher uses language expansions and extensions effectively to elicit language and increase child's oral language skills.	Y = Throughout the lesson, teacher responds to what the child says and uses strategies on pp. 17-18 of the RRLI Teacher's Guide to expand/extend the child's response. Teacher's expansions/extensions are appropriate for the child's language level (+1 element). P = The teacher expands and extends the child's the child's language. Sometimes the expansions/extensions are too complex for the child's language level. N = Teacher does not use strategies to expand/extend the child's response, or consistently uses expansions/extensions that are too complex for the child's language level.
8. Teacher uses follow-up questions effectively to elicit language and increase the child's oral language skills.	Y = Throughout the lesson, the teacher asks follow-up questions to which the child responds. P = The teacher asks follow-up questions, but the child does not respond. N = The teacher does not ask any follow-up questions.
9. Teacher follows the child's lead (Observes, Waits, Listens), and responds contingently, expanding or extending the child's language.	Y = The teacher responds to what the child says, and builds on what the child says. P = The teacher responds to what the child says, but does not build on the child's response, (e.g., expanding or extending). N = The teacher does not respond to what the child says, and asks questions or makes comments unrelated to the child's response.
10. Teacher provides 6-12 opportunities per minute for the child to respond during the activity.	Y = Teacher provides 6-12 opportunities per minute for the child to respond during the activity. P = Teacher provides 3 to 5 opportunities per minute for the child to respond during the activity. N = Teacher provides only 1 to 2 opportunities per minute for the child to respond during the activity.

Activity Management (Check all that apply)	
1. Teacher engages the child and gets into the lesson quickly. Reminds child of Reading Ready rules as needed.	Y N
2. Materials are ready and organized.	Y N
3. Teacher proactively provides positive attention to child for attention and appropriate behavior.	Y N
4. Teacher paces lesson to maintain attention.	Y N
5. Ratio of positive teacher attention for appropriate behavior to attention for misbehavior is at least 5/1.	Y N

Note: Y = Yes. P = Partial. N = No. NA = Not Applicable.

Child Behavior	Notes
Accuracy of responses (Check one) ☐ => 80% appropriate/accurate responses ☐ 40% - 80% appropriate/accurate responses ☐ =< 40% appropriate/accurate responses Level of engagement (Check one) ☐ Was highly engaged with activities ☐ Generally attentive and engaged, occasionally had difficulty ☐ Had difficulty attending/keeping engaged Language abilities (Check one) ☐ Expanded/elaborated sentences ☐ 3-element sentences ☐ 2- to 3-word phrases ☐ 1 word responses ☐ Nonverbal	
Setting	**Notes**
Describe: Level of Noise/Distraction of Setting ☐ Quiet and nondistracting ☐ Generally quiet, occasional distractions ☐ Noisy and highly distracting	

CHAPTER 4

Vocabulary/Language Intervention through Storybook Reading for Pre-Kindergarten Children with Hearing Loss

Abstract

On the basis of the knowledge learned from the research synthesis and research study, this chapter highlights practical information in implementing a vocabulary/language intervention through storybook reading. Teachers and parents can learn how to read storybooks with children with hearing loss using effective strategies. Ultimately, teachers and parents can help children increase their vocabulary and language skills which are critical components for later reading success.

Chapter 4

Vocabulary/Langauge Intervention through Storybook Reading for Pre-Kindergarten Children with Hearing Loss

Introduction

Vocabulary and oral language development for children with hearing loss have gained more attention due to the universal newborn screening and technology development (i.e., cochlear implant or hearing aids). Prompt and continuous support regarding vocabulary and language development for children with hearing loss is imperative because even minimal hearing loss threatens the development of vocabulary and language of those children as compared to their hearing peers (Davis, Elfenbein, Schum, & Bentier, 1986; Delage & Tuller, 2007; Wake, Hughes, Poulakis, Collins, & Rikards, 2004). Furthermore, research indicates that well-developed vocabulary and language skills positively affected hearing children's later reading success (Scarborough, 2001; Snow, Burns, & Griffin, 1998; Whitehurst & Lonigan, 1988). The positive relationship between vocabulary/language development and reading achievement is also true for children with hearing loss (Aram, Most, & Mayafit, 2006; Connor & Zwolan, 2004; Fung, Chow, & McBride-Chang, 2005; Kyle & Harris, 2010; Paul, 1998). Therefore, supporting vocabulary and language development for children with any degree of hearing loss is significant.

Several studies have reported that exposure to frequent storybook reading increases reading skills of children with or without hearing loss (Johnson & Roberson, 1988; Pakulski & Kaderavek, 2012; Wells, 1985; Zevenbergen & Whitehurst, 2003). In particular, children's reading skills are enhanced when they have opportunities for storybook reading with interactive features (i.e., shared book reading and dialogic reading) or manipulative features (i.e., felt board cutouts), it effectively enhanced children's reading skills (Pakulski & Kaderavek, 2012; Wells,

1985; Zevenbergen & Whitehurst, 2003). Storybook reading has also been positively related to vocabulary and language development for children with or without hearing loss (Aram et al., 2006; Crain-Thoreson & Dale, 1999; Fung et al., 2005; Scarborough & Dobrich, 1994). As a result, vocabulary, language, and reading are interrelated, and positively affect the reading success for children with hearing loss.

Most hearing children learn vocabulary and language incidentally by interacting in their natural environments. Children with hearing loss, however, require explicit and intentional instruction to improve their vocabulary and language skills because of the lack of incidental language learning opportunities (Baker, Simmons, & Kameenui, 1995; Barker, 2003; Crosson & Geers, 2001; Justice, Swanson, & Buehler, 2008; Lederberg & Spencer, 2009). Given the importance of explicit and intentional vocabulary/language instruction for children with hearing loss, this article aims to provide practical information regarding implementing a vocabulary/language intervention through storybook reading for teachers and parents.

Vocabulary/Language Intervention through Storybook Reading

In this section, I will describe how teachers and parents can prepare for an effective vocabulary/language intervention through storybook reading. Also, I highlight specific techniques and strategies for successfully implementing the intervention. Finally, I describe how teachers and parents can use rewards to increase children's interests and motivation.

Preparation for Storybook Reading

Before starting the storybook reading, selecting appropriate storybooks is necessary. In addition, preparing for the intervention setting and scheduling are important procedures.

Selection of storybooks. It is important to select appropriate storybooks for children with hearing loss. First, select storybooks that include relatively simple written text and more visual

support (i.e., illustrations). By seeing the illustrations, children not only are aided in easily understanding the story, but also the illustrations provide a catalyst for them to naturally express their impressions or feelings. The result is that they have more opportunities to speak. Second, choose storybooks that include target vocabulary cards which teachers and parents can use with the children after the storybook reading is completed. Teachers and parents can further talk about the target vocabulary and, thereby, promote children's language use. If target vocabulary cards are not included in an appropriate storybook, select important vocabulary from the storybook and create a set of target vocabulary cards. Third, select storybooks that contain meaningful and authentic contexts (i.e., school, home, or outside) so that children are able to share their experiences in those contexts. Fourth, choose storybooks that have embedded games (e.g., board games) or manipulative features (e.g., felt board cutouts). These additional materials can boost children's learning because children often can better memorize words that they learn through interaction.

Setting. The intervention can be implemented either at school or at home depending on who implements the intervention. In other words, parents can implement the intervention at home, or teachers can implement the intervention at school. Wherever the intervention occurs, it is important to collaborate between teachers and parents in order to maximize children's outcomes (Byrne, 2000). If both a parent and teacher are well aware of the storybooks and one of them implements the intervention, the other still can talk with the child about the stories even though he or she does not implement the intervention. This will provide the child with more opportunities to share the story and to increase language use. The intervention setting should have little environmental noise distraction, because, often noise impedes the ability of children with hearing loss to listen to important content.

Scheduling. In order to maintain children's concentration and keep the storybook reading as a daily routine, take about 15 minutes per session. Read the storybooks two to four times a week and continue the intervention for at least for 10 to 15 weeks. If enough storybooks are selected, continue the storybook reading throughout the preschool years. The intervention can be more beneficial when it is incorporated as a daily routine rather than an additional duty or assignment. In the home setting, in order to routinize the intervention, the instruction might become part of a family's daily routine for the parent-child dyad every night for 15 minutes before going to bed. Similarly, in the school setting, children can regularly participate in the instruction during preschool routines according to teachers' guidance.

Implementation Strategies

Children with hearing loss learn better when instructional experiences are repeated (Barker, 2003; Kaderavek & Pakulski, 2007; Massaro & Light, 2004; pakulski & Kaderavek, 2001). Therefore, teachers and parents can consider reading one storybook several times a week. That is, read one storybook about three times a week so that children become familiar with the story and are able to retell the story for themselves.

After reading each page, ask children appropriate questions in order to check their understanding of the content. The questions may range from simple comprehension questions to more complex questions requiring cognitive skills calibrated to children's language levels. Specifically, teachers or parents can ask questions which are direct (e.g., Where is Bobby?), indirect (e.g., What are Pablo and Fae doing?), predictive (e.g., What do you think Pablo and Fae are making?), inferential (e.g., How do you think Bobby feels?), and/or extensive (e.g., Do you like to swing high? How do you make yourself go higher?) according to children's language skills. In particular, inferential questions about the story sequence (e.g., what happened before

[after] Bobby cleaned his room?) can increase children's understanding of abstract concepts which is a difficult skill for many children with hearing loss (De Feu & Fergusson, 2003; Ingber & Eden, 2011; Marschark, Lang, & Alertini, 2002; Pakulski & Kaderavek, 2012; Passig & Eden, 2003).

Children with hearing loss benefit from visual support, an important instructional strategy to promote learning (Barker, 2003; Easterbrook, 1999; Massaro & Light, 2004; Musselman, 2000; Walker, Munro & Rickards, 1998). Use storybook illustrations as a means of increasing children's understanding of content as well as providing children with more opportunities to share what they think about the content. When children talk about the content by seeing the illustrations, follow their directions and revise or expand their expressions.

In order to increase the effectiveness of the intervention and gain more attention from children, provide a structured storybook reading time. For example, briefly read a storybook for five minutes. Then, for three minutes, practice a set of 10 target vocabulary cards retrieved from the storybook. In addition to reading the vocabulary words, also ask children to tell what they know about each word in order to guide children in expanding their knowledge. For the remaining seven minutes, let the children positively participate in activities. That is, children can retell the story manipulating felt board cutouts or play a board game using a number dice and piled vocabulary cards.

Rewards

Rewards increased children's engagement and different children got motivated by different rewards. Therefore, it is important to understand each of the children's interests and motivation. Although stickers and stamps are pretty common means of rewarding children's participation, some children are simply motivated by encouraging words. Other children are

motivated by more active rewards. For example, children may want to play a short "hide and seek" game before they start the intervention. Because the main purpose is reading the storybooks with children, shorten the length of the game (i.e., one minute), but consistently play the game before every storybook reading session, if the child prefers this type of activity in order to be open to a reading experience. These children may become energetic enough to be engaged in storybook reading. Given that parents and teachers know the children very well, it is helpful to identify the best ways of promoting children's participation and best effort.

Summary

Vocabulary and language development are critical for children with hearing loss. Using storybook reading, teachers and parents can promote children's vocabulary and language development. Before starting the storybook reading, select appropriate storybooks that may promote children's vocabulary and language development. That is, select storybooks that include: (a) clear illustrations incorporated with simple written text; (b) embedded target vocabulary cards; (c) authentic and meaningful contexts for children (i.e., school, home, or outside); and (d) manipulative activities (e.g., felt board cutouts, board games, etc.). Select a quiet place either at home or at school depending on who implements the intervention. Schedule an appropriate time period in which either parents or teachers can consistently implement the intervention. During the storybook reading, complete one storybook a week while repeatedly reading the same storybook. Ask diverse questions to children and use visual support to promote their understanding and language improvement. A structured storybook reading experience includes (a) the storybook reading; (b) vocabulary practice, and (c) activities that would provide additional practice for children. Throughout the intervention sessions, keep encouraging children and reward their participation according to each of their interests. Children will be able to keep

their interests in storybook reading and, ultimately, improve their vocabulary and language skills which are critical components for later reading success.

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